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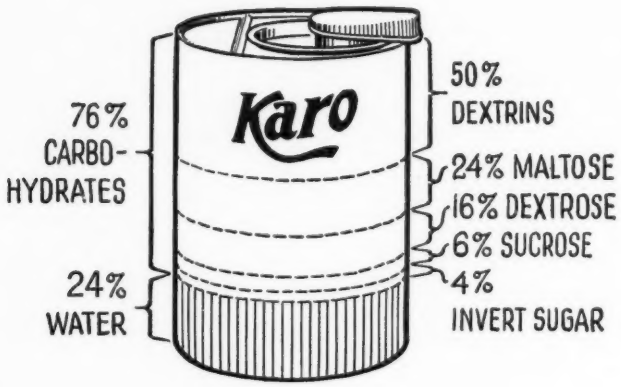

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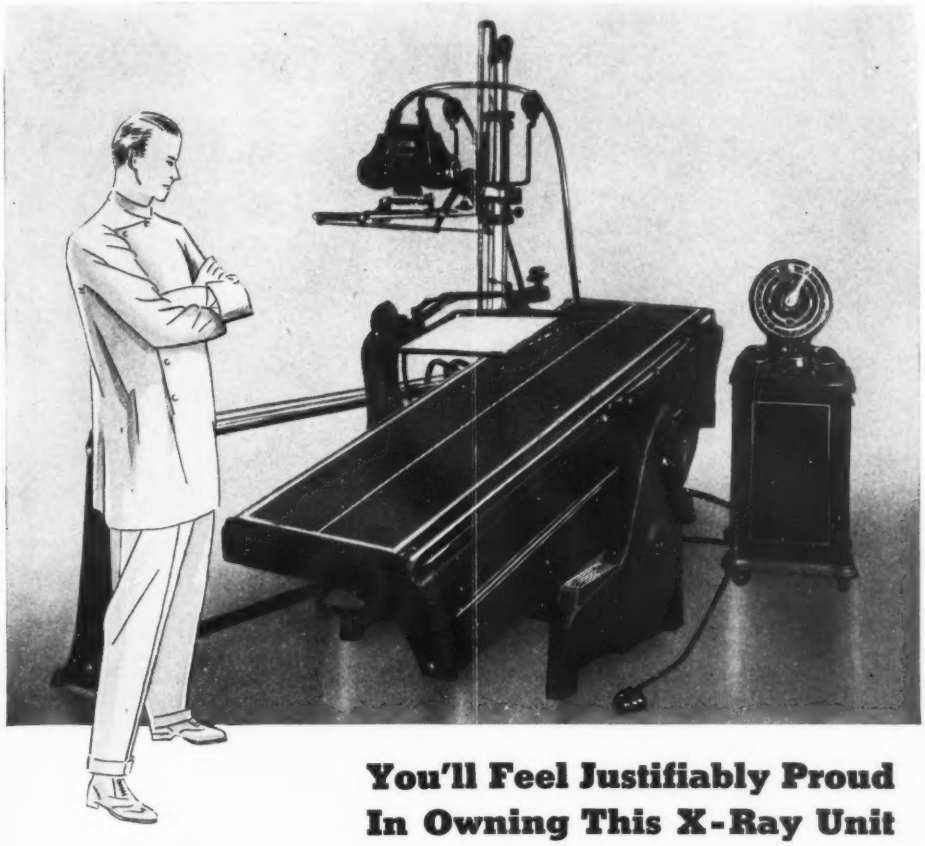

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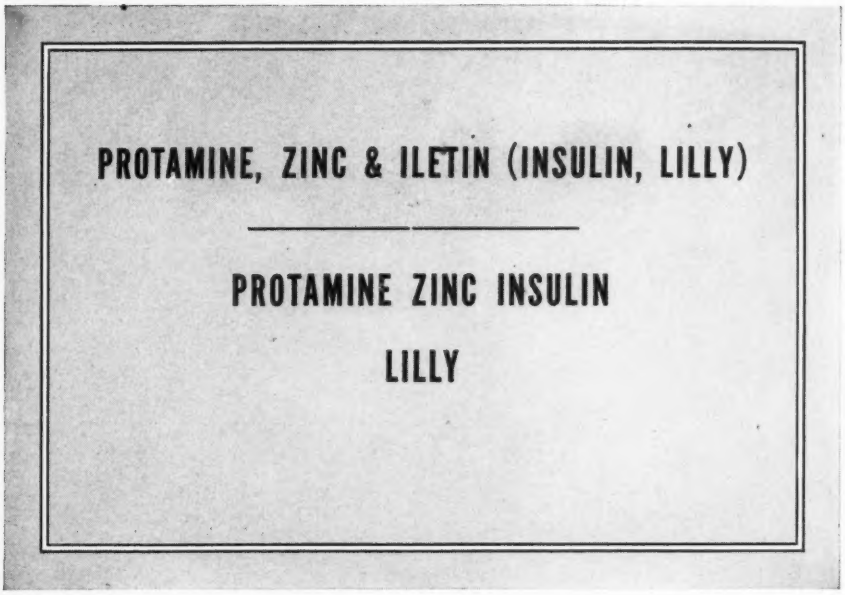

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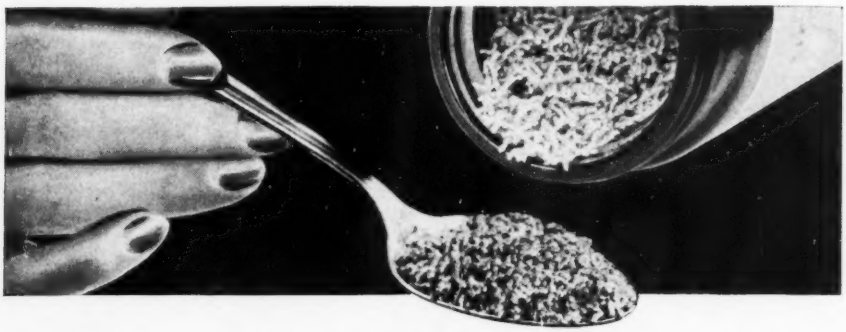

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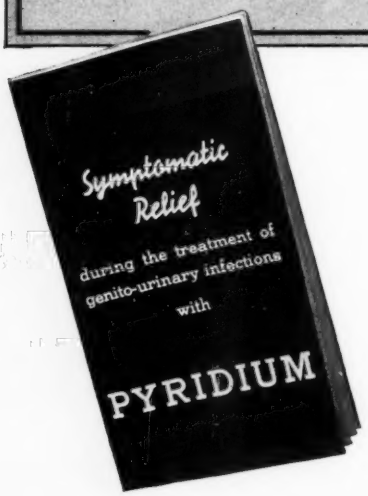

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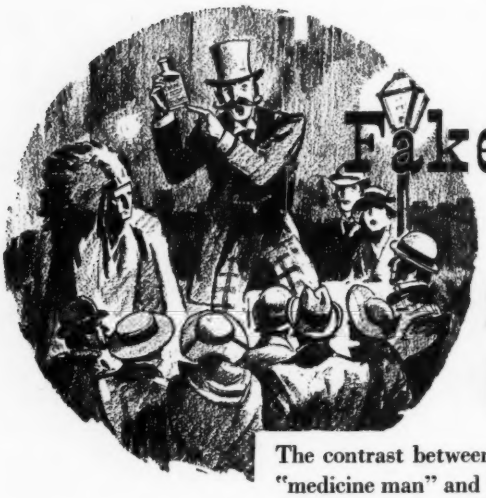

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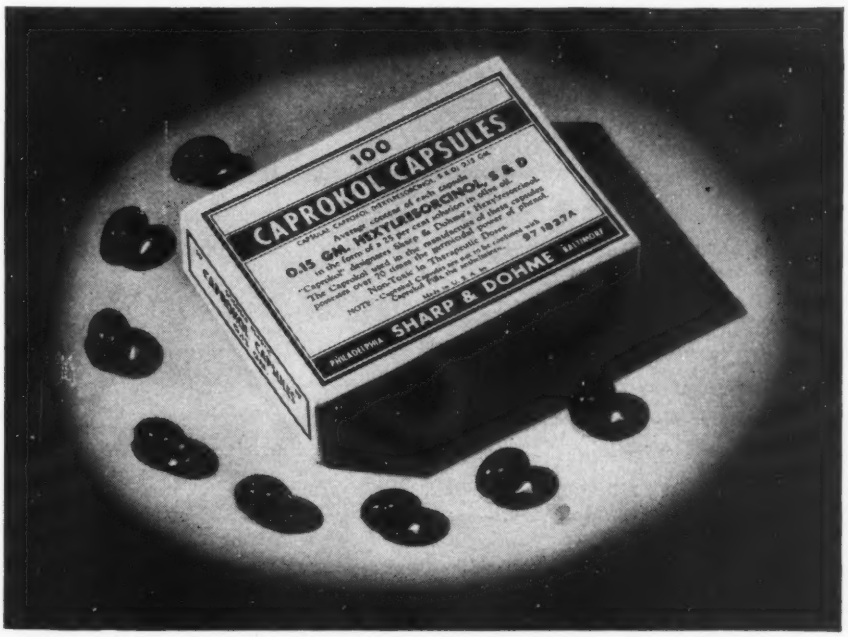

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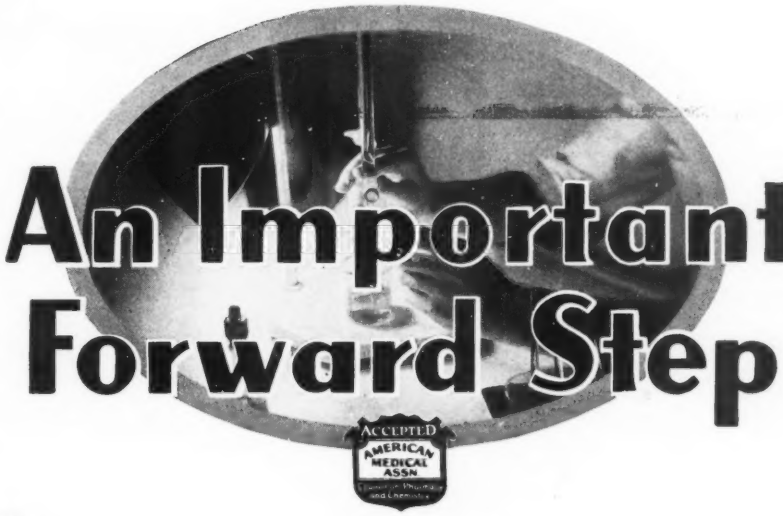

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LIQUID TABLETS CAPSULES
EACH 2 DROPS EQUALS 1 TEASPOONFUL
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Milk Modifier

contains

Maltose and Dextrins
Cereal Proteins
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It is
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fed on milk properly modified
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Mellin's Food
that they are not troubled
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Constipation

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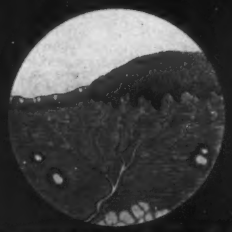

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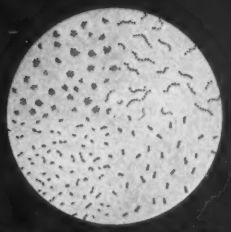

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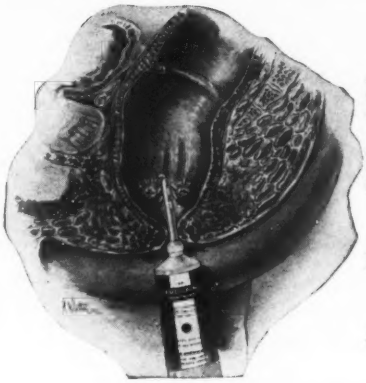

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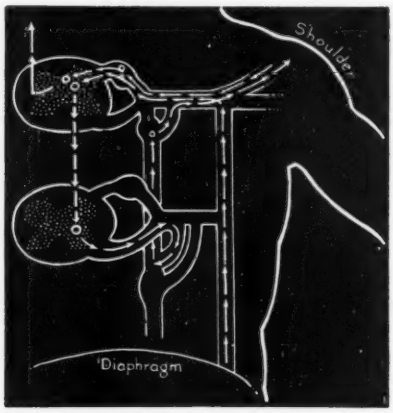

Schematic drawing showing the route of referred pain to the shoulder tip that originated in the diaphragmatic pleura.

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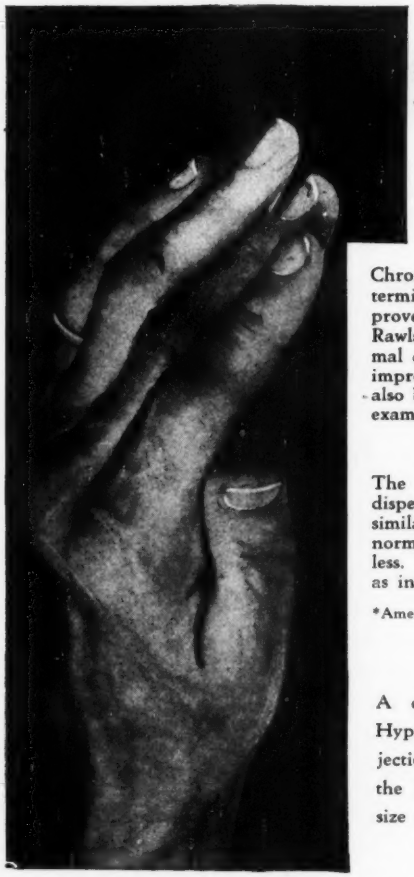

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*Amer. Jr. of Med. Sciences, Sept. 1935, pp.400-409.

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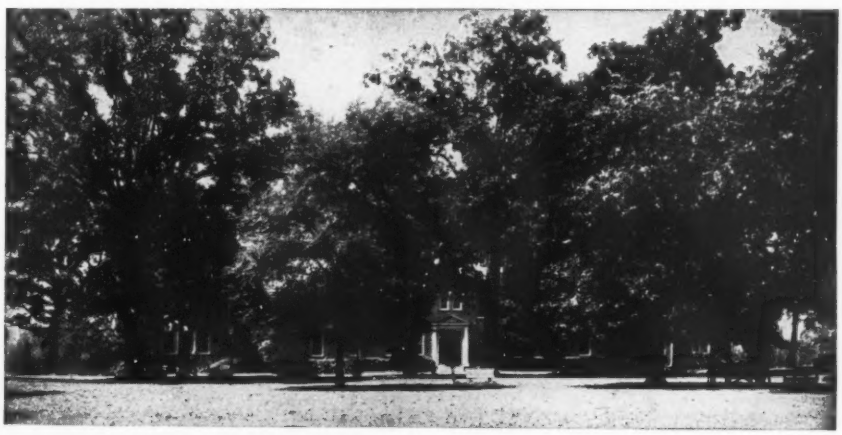

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JOURNAL OF THE SOUTHERN MEDICAL ASSOCIATION

PUBLISHED MONTHLY BY THE SOUTHERN MEDICAL ASSOCIATION AT BIRMINGHAM, ALA.

Volume 30 APRIL 1937 Number 4

THE FUNCTION OF THE OTOLARYNGOLOGIST*

By M. F. ARBUCKLE, M.D.
St. Louis, Missouri

It was thought worth while to present a condensed review of some of the developments in the field of practice and in the teaching of otolaryngology within the past twenty-five years. My remarks will deal chiefly with the field of otolaryngology, but certain phases of the subject are closely related to the work of the ophthalmologist. The adaptation of many facts already known, as well as much new information developed during this period regarding the physiology and anatomy of this region of the body, have enabled us better to understand many difficult problems.

A more thorough and widespread knowledge of the gross and minute anatomy, both normal and pathological, have increased our understanding of disease and improved our methods of dealing with it. The use of the x-ray, with and without iodized oil, has been a great addition to our diagnostic armamentarium[6 7 8] (*Fig. 1, Case 1*). Special methods of illumination, such as transillumination, the nasopharyngoscope, and the arc light also have increased our ability to visualize the deeper recesses of the upper respiratory tract. The same is true with regard to illumination and exploration of the lower respiratory tract, esophagus, and stomach.

The relationship between constitutional disorders and those of the respiratory tract has of course been a subject full of interest over which there has been, and still is, not a little controversy, with the result that in many instances our previous conception both as to diagnosis and as to methods of treatment have been either greatly modified or discarded. Thus, for example, is recalled the popularity of the idea of focal infection as a cause of disorders of almost any nature and the inevitable increase in surgical intervention as a means of relief for not only the local disorder, but the general disorder as well. As is coming to be more generally recognized, a large proportion of local nasal disorders are merely nasal manifestations of a general condition, which for lack of a better name, is referred to as allergy. Such cases formerly were thought to be of an infectious origin, and for this reason the treatment in the main was surgical; whereas now, the treatment for this type of case is primarily medical with surgical intervention only in selected cases. Much of the important groundwork for the development of this information was laid by the serious work of a few of the older men, many of whom are now dead.

Not a few of the members of this Section, I am sure, will recall with great interest the contributions of Sluder,[9] especially on the subject of the surgical anatomy of the nose, paranasal sinuses, the pharynx, and his contributions in the cause and treatment of headache, of which he listed several types. His experimental studies in blocking the nasal ganglion for the relief of certain other associated disorders as well as for the relief of headache are most important and interesting. His operation for the removal of the tonsil with nitrous oxide anesthesia is, when understood, a most satisfactory one. In my opinion for many reasons it is preferable to any and all other methods. Its great value is demonstrated when tonsillectomy is indicated in patients with serious constitutional disorders, such as acute nephritis or pulmonary disease. This method also is especially useful in tonsillectomy in the hemophiliac. Here with intratracheal nitrous oxide anesthesia, the tonsil may be picked up by the Sluder tonsillotome, which is wired for diathermy, and the cutting current will excise the tonsil without bleeding at the time or afterwards.

*Chairman's Address, Section on Ophthalmology and Otolaryngology, Southern Medical Association, Thirtieth Annual Meeting, Baltimore, Maryland, November 17-20, 1936.

*From the Department of Otolaryngology, Washington University School of Medicine.

The absence of postoperative complications, especially lung abscess, after tonsillectomy by Sluder's method, is noteworthy. His method of opening the ethmoid labyrinth, of enlarging the nasofrontal duct, and for intranasal drainage of orbital abscess are excellent, safe, and very effective.

With our present knowledge of the symptomatology of allergic manifestations, such as: nasal obstruction, sneezing, headache, the neck-arm-shoulder syndrome, it is now apparent that Sluder's work led up to the threshold but not quite to the solution of these disturbances which in many instances, as you all know, are accompanied by many types of neuralgia caused by irritation of the nasal ganglion rather than by pressure.

The work of R. C. Lynch,[3] especially his surgical treatment of suppuration of the frontal sinuses and of malignant disease of the larynx, will stand out as a monument to his apparently unlimited supply of energy and ingenuity (*Fig. 2, Case 2*).

Our knowledge of the anatomy, physiology, and pathology, of disorders of the internal ear, with special regard to its relationship to disease of the central nervous system, has received tremendous impetus during this period. Infections of the mastoid process and its complications and sequelae have also been the subject of much hard work, resulting in important developments in our better understanding of these most serious problems. I refer particularly to disease of the petrous portion of the temporal bone and to the intracranial complications with which we are at times confronted.

In the field of endoscopy, we have witnessed great developments during this period. The outstanding work of Jackson[4] and his school is responsible chiefly for the high state of perfection of our methods of diagnosing the presence of foreign body in the tracheobronchial tree and esophagus, and for methods of their removal (*Figs. 3* and *4, Case 3*). Here again, the value of x-ray study has been demonstrated.

The diagnosis of pulmonary disorders of a more or less obscure nature is now possible in many cases as a result of our ability to visualize and localize through the bronchoscope the involved area (*Fig. 5, Case 4,* and *Fig. 6, Case 5*). We are at once enabled to obtain secretions for bacteriological study and tissue specimens for microscopic study. We are by the same method enabled to apply treatment to lesions such as abscess, bronchiectasis, pulmonary hemorrhage, bronchial stenosis, and to remove broncholiths, foreign bodies, and so on (*Figs. 7* and *8, Case 6,* and *Figs. 9, 10, 11* and *12, Case 7*). With the developments in the field of thoracic surgery, and as a result of collaboration between the thoracic surgeon, the internist, the radiologist, and the bronchoscopist (*Figs. 13, 14* and *15, Case 8*) the possibilities for dealing with malignant disease of the lung have now become realities, and while this field of surgery is still in a developmental stage and has necessarily a high mortality rate, the results are improving steadily. Worth while surgical intervention in cases of bronchiectasis, abscess and non-malignant intrathoracic disease is being practiced throughout the world with success. The bronchoscopist is directly interested in these cases from the standpoint of both diagnosis and treatment. It is of interest to all of us to recall that among the first to describe lung abscess following tonsillectomy was Dr. C. W. Richardson, a nose and throat man of Washington, D. C.

Within only very recent times, we have witnessed the development of a special x-ray equipment, known as the kymograph, which records every movement of every organ within the thorax as well as its walls. This device is at times of extremely great help in differentiating aneurysm and tumor, and in outlining the movements of the lung, the diaphragm, the chest wall, the heart, and so on. It is being demonstrated in the scientific exhibits at this meeting by Dr. Sherwood Moore and Dr. W. G. Scott.

Progress in the diagnosis and classification of malignant disease during this period has been great. This point is better emphasized when we remember that approximately fifty years ago cancer of the larynx was considered a practically hopeless disease. At the present time, intrinsic cancer, which comprises the majority of cases, is curable in practically 82 per cent of the cases without removal of the larynx (*Case 9*).

Tremendous developments have taken place in radiation therapy for malignant disease, and the satisfactory results obtained in many instances justify the hope of cure in many cases hitherto doomed. Subcutaneous radiation of tumors of the brain, pharynx, tongue, bladder, and other inaccessible regions after surgical exposure is now being practiced at the Mallinckrodt Institute of Radiology (*Case 10*). Sufficient time has not yet elapsed for the formation of definite conclusions as to its relative value, but appearances to date have encouraged its further trial.

Improvements in the field of anesthesia have placed this difficult problem on a more satisfactory basis. The departure from the unlimited use of cocaine, especially by injection, is probably one of the most important steps forward.

Another improvement is the development of endotracheal anesthesia for operations about the mouth, the throat, and intrathoracic operations, and in the field of plastic surgery. With intratracheal anesthesia, properly applied, the air intake may be accurately controlled, the trachea may be kept free of secretions, drainage from a lung abscess during manipulation may be removed by suction, and intra-pulmonary pressure may be maintained when the chest is opened. Plastic surgery is a special field of great interest to the otolaryngologist, but time permits reference only to the tremendous progress in this type of surgery during the period under consideration.

There have been many improvements in operative technic worthy of mention. Some of these are, for example, the use of the perforator and burr in opening the mastoid process in preference to the use of the mallet and chisel. This may seem an insignificant matter, but I believe it is worthy of mention because of the avoidance of intracranial trauma as a result of the use of the mallet.

Minor operations in the larynx, including the removal of biopsy specimens or benign tumors, are best done by direct laryngoscopy. Direct laryngoscopy as a means of examining the larynx in children and in individuals who are unable to submit to indirect laryngoscopy for this purpose or for the removal of benign tumors and biopsy specimens, has greatly increased our efficiency in the study of disease of the larynx.

During the period under consideration we have witnessed a transformation in the field of teaching otolaryngology, in both undergraduate and graduate studies. Formerly Vienna and other European cities were the Mecca for those desiring instruction in this field. This was in part necessary because of a lack of facilities in this country. At the present time we have several excellent schools in the United States whose function is primarily to train men to practice as specialists in otolaryngology.

Still another important development has been the establishment of a board of examiners, the membership of which is made up of representatives from the various national medical organizations, general and special. This board is empowered to certify for the benefit of the public as to the fitness of men who desire to practice as specialists.

Case reports, which exemplify some of the points mentioned, are herewith presented.

Fig. 1, Case 1

Case 1.—Iodized oil film of the maxillary sinuses demonstrating the presence of thickened membrane within the sinuses in a case of suppurative sinusitis.

This patient also had bronchiectasis. It has been found in patients with bronchiectasis and associated suppurative sinusitis that an important step in the treatment is the elimination of the sinus suppuration, preferably before surgical intervention in the chest.

Case 2.—A. K., a white woman, registered nurse, aged 24, whose chief complaint was severe frontal headache with copious nasal discharge. A diagnosis of suppurative pansinusitis was made.

Photograph shows cosmetic result after bilateral external frontal operation by the Lynch method. In this instance both sides were operated upon at one sitting under local anesthetic and "twilight sleep." This patient was operated upon some years ago, and to date has had relief from all symptoms.

This method of operating upon the frontal sinuses has many advantages, two important ones of which are satisfactory healing and freedom from external deformity.

Case 3.—R. C., a white boy, aged 2 years, was admitted to Saint Louis Children's Hospital October 19, 1932, with a history of having aspirated a peanut while eating salted peanuts the day before. At the time of the accident he was seized with an attack of coughing, choking,

cyanosis, and marked indrawing of the epigastrium. Since the accident he had had a wheezing breath sound.

Physical examination revealed an "asthmatoid wheeze." Indrawing of the epigastrium and intercostal spaces was noted. He had an occasional cough and hyperresonance with diminished breath sounds at the right base. Respiratory rate was 40; pulse 124; and he had moderate fever.

Fig. 2, Case 2

The fluoroscopic examination revealed emphysema throughout both lungs on inhalation, and throughout the right lung at the end of exhalation. At the end of exhalation the heart was shifted to the left, and the left lung was deflated. The right lung remained tightly inflated. The left diaphragm at the end of exhalation was high, while at the end of inhalation it was low. The left diaphragm moved freely, whereas the right was low and was fixed in that position. The ribs on the right remained in a more horizontal position, while on the left they shifted from the horizontal to the vertical position on inhalation and exhalation.

X-ray films made at the end of full exhalation (*Fig. 4, Case 3*) and at the end of full inhalation (*Fig. 3, Case 3*) show a typical cardiac displacement and variations in the portion of the two leaves of the diaphragm, and in the position of the ribs on the two sides as is seen in the presence of obstructive emphysema of the right lung.

The diagnosis of non-opaque foreign body in the right main bronchus was made and was confirmed at bronchoscopy, when a half peanut was removed therefrom. The child developed laryngeal obstruction on the following day, sufficiently severe to require tracheotomy. The patient wore a tube for two or three days, but otherwise made an uneventful recovery. He went home in a few days, apparently fully recovered.

Case 4.—J. G., a white man, aged 49, was admitted to the Chest Service of Barnes Hospital on February 27, 1933. Chief complaints were: a chest disorder of two and a half years' duration, accompanied by symptoms of lassitude, loss of weight and intermittent fever. In June, 1929, he had pneumonia; this apparently was on the right side. In July, 1932, he had chills, malaise,

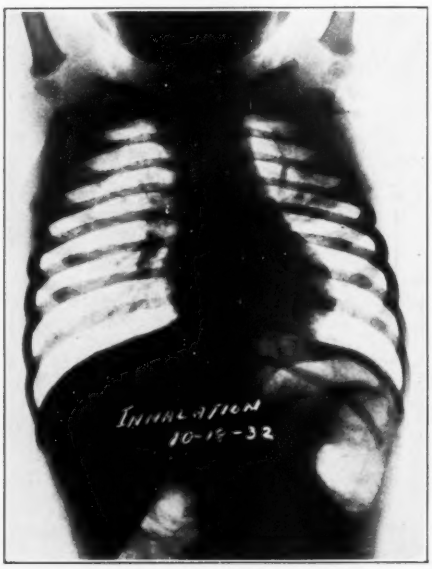

Fig. 3, Case 3

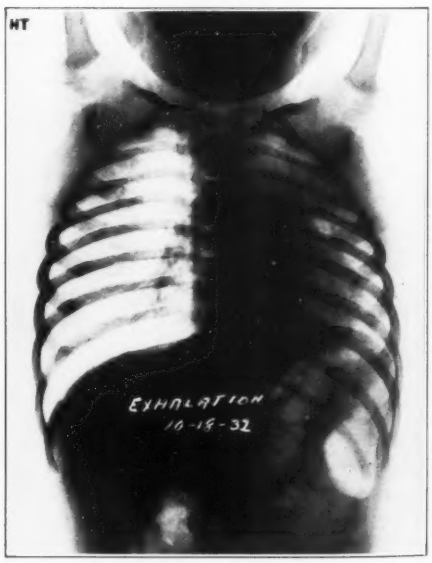

Fig. 4, Case 3

Fig. 5, Case 4

with a temperature of 104° F. There were no physical signs in the chest and no findings elsewhere.

X-ray films made in August of 1932, showed a funnel-shaped shadow in the left upper lung. The patient was still without abnormal physical findings. There was some improvement for a time.

In October, 1932, the patient again had a chill. The chest findings were the same. Soon thereafter the shadow in the chest films became larger. Then dullness was perceptible, but no rales were found. The patient thought he probably had an abscess. On December 5, 1932, an attempt was made to find the abscess by thoracentesis without results. He was then given artificial pneumothorax. This shows in the plate as does the filling defect at the opening to the bronchus of the left upper lobe.

Tumor of the lung was suspected, and the patient came to Dr. E. A. Graham for diagnosis and treatment. After careful physical and x-ray study, bronchoscopy was recommended to learn the nature and cause of the filling defect at the junction of the upper and lower lobe bronchi.

At the first bronchoscopy it was possible to see a reddened mass just inside the opening of the bronchus to the left upper lobe. A biopsy specimen was obtained with difficulty, but it was inadequate for diagnosis.

A second bronchoscopic examination was made fourteen days later, and a small specimen was obtained. A diagnosis of squamous cell carcinoma was made, but it was felt wise to repeat it because of the fact that the specimen was considered inadequate. A third biopsy specimen was taken one week later and the same diagnosis, namely, squamous cell carcinoma, was made.

After further study a pneumonectomy was decided upon, and this operation was carried out on April 5, 1933. It may be mentioned in passing that this is the first case on record in which total pneumonectomy for endobronchial carcinoma was successfully carried out.

This patient made a complete recovery and is still well without evidence of recurrence. He is practicing medicine in Pittsburgh.

Case 5.—E. R., a white woman, aged 42, was admitted to the Chest Service of Barnes Hospital September 16, 1936, with a diagnosis of unilobar bronchiectasis, and with the suggestion that lobectomy might be required.

The patient was a highly emaciated, nervous woman with a constant productive cough. She rarely took a breath day or night without coughing, with the result that she was exhausted from this effort alone.

Her illness was of unknown origin and had persisted for about two years. Because of the peculiarity of the filling defect, as is indicated by the arrow, it was thought wise to examine the patient again bronchoscopically, keeping in mind the possibility of carcinoma and foreign body. At bronchoscopy, I found at the level of the filling defect a mass of granulation tissue which fairly well filled the bronchial lumen. The whole area was bathed in pus, and the granulation tissue bled freely upon touch. It was removed with biting forceps and a specimen was submitted for microscopic study. There was free bleeding, but this was controlled by pressure and the local application of epinephrine and cocaine. At the level of the granulation tissue the bronchial lumen was reduced to a diameter of about four millimeters, apparently the result of cicatricial contraction.

A white object which moved with respiration was visualized below the stenosis. When grasped with the forceps, it felt as if it were either bone or broncholith. It was necessary to break it up into fragments and to remove it piece-meal. When pieced together after removal, its diameter was about nine millimeters. Decalcification and microscopic study failed to reveal its origin.

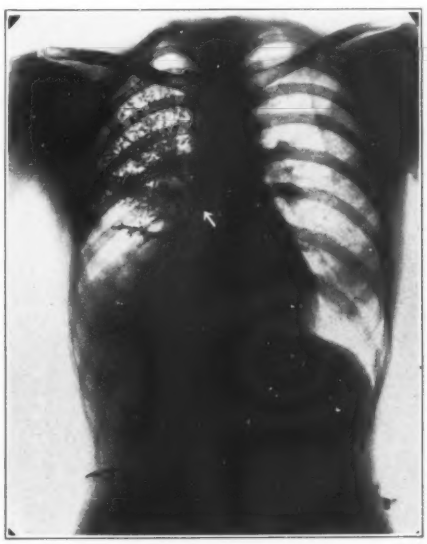

Fig. 6, Case 5

At bronchoscopic examination three days later, it was found that at the level of this stenosis the redness had diminished and there was no appreciable amount of granulation tissue present. The amount of pus also was diminished, and the patient's cough had improved materially.

She was sent home for a period of observation, which was to include postural drainage and general medical treatment with the idea of further examination at a later period to determine whether or not surgical intervention would be required.

This case demonstrates the value of adequate bronchoscopic study in the diagnosis and treatment of obscure pulmonary disorders.

Case 6.—V. L., aged 32, colored, was admitted to Barnes Hospital March 2, 1936, with the complaints of cough with purulent sputum, hemoptysis, and a weight loss of twenty-eight pounds.

Physical examination showed limited chest expansion on the right and diminished breath sounds over the right base posteriorly and laterally.

The Wassermann was four plus.

Films not included show a shadow over the right lower chest.

Upon bronchoscopic study, a huge mass of granulation tissue was visualized in the bronchus to the right lower lobe. There was also some pus in this bronchus. Granulation tissue was removed with a biting forceps, and immediately the bronchoscope was filled with pus. With suction about 200 c. c. of pus was recovered, and an additional amount flowed out of the bronchoscope.

Iodized oil injected through the bronchoscope on April 4, 1936 (*Fig. 7*) gave the picture shown under that date. The granulation tissue was removed from the point nearest the vertebral column, as indicated by the shadow.

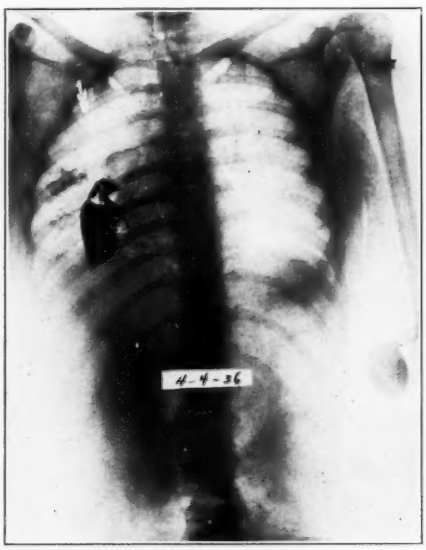

Fig. 7, Case 6

This patient was bronchoscoped five times in about six weeks. The film of April 30, 1936 (*Fig. 8*) and others not included, show a diminished size of the abscess and also give valuable information as to the location of the abscess. This is important in the event of surgical intervention.

The patient made a symptomatic recovery with freedom of cough, temperature, sputum and gain of weight and energy. She was examined five months later and found to be free of all symptoms.

Case 7.—A. H., a white woman, aged 49, was admitted to Barnes Hospital February 11, 1936, with a tentative diagnosis of endobronchial carcinoma.

Fig. 8, Case 6

Fig. 9, Case 7

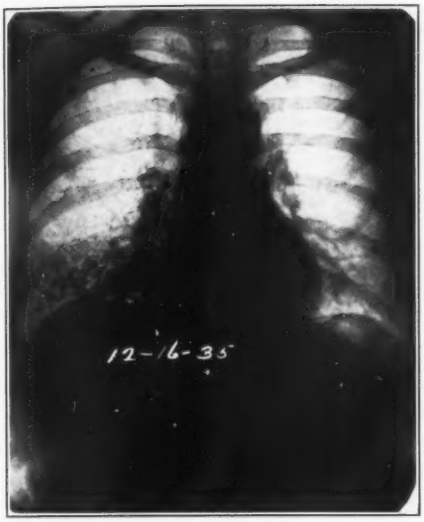

Fig. 10, Case 7

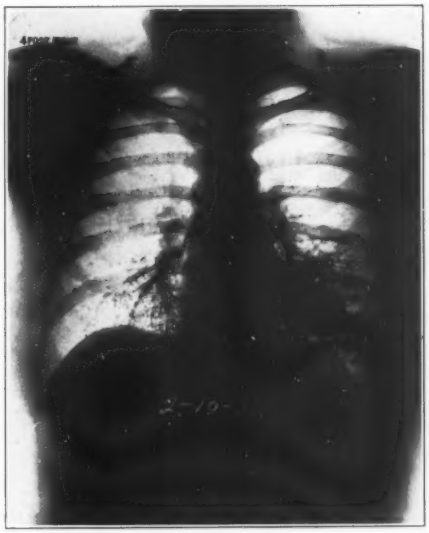

Fig. 11, Case 7

She gave a history of having had a troublesome cough for several months with some blood-tinged sputum and some loss of weight. There was no history of aspiration of a foreign body, but she did say she had a rattle in her breath at times.

The x-ray taken on December 12, 1935 (*Fig. 9*), shows atelectasis of the right lower lobe with displacement of the heart and the trachea to the right. The stomach bubble is plainly evident on the left.

In the x-ray of December 16, 1935 (*Fig. 10*), the atelectasis of the right lower lobe has cleared up. There is a shadow in line with the left main bronchus which is not shown in the other plates. These changes indicate the presence of an unimpacted foreign body.

In the x-ray of February 10, 1936 (*Fig. 11*), there is a filling defect in both bronchial tubes with evidence of calcification of the hilar glands.

At diagnostic bronchoscopy, I found a broncholith in the left bronchus and a partial stenosis of the right bronchus. The broncholith was removed and is shown in the accompanying photograph (*Fig. 12*).

There was some thickening at the site of the broncholith in the left bronchus. At the level of the stricture in the right bronchus, there was granulation tissue. Microscopic examination of this showed it to be inflammatory in nature. This was treated by removal with the biting forceps.

The patient has been free of symptoms since this treatment.

This case was reported at the annual meeting of the Mid-western Section of the American Laryngological, Rhinological and Otological Society, held in Chicago, in January of this year.

Case 8.—C. G., a white girl, aged 4 years, was referred to Dr. Evarts Graham on June 8, 1935, with a diagnosis

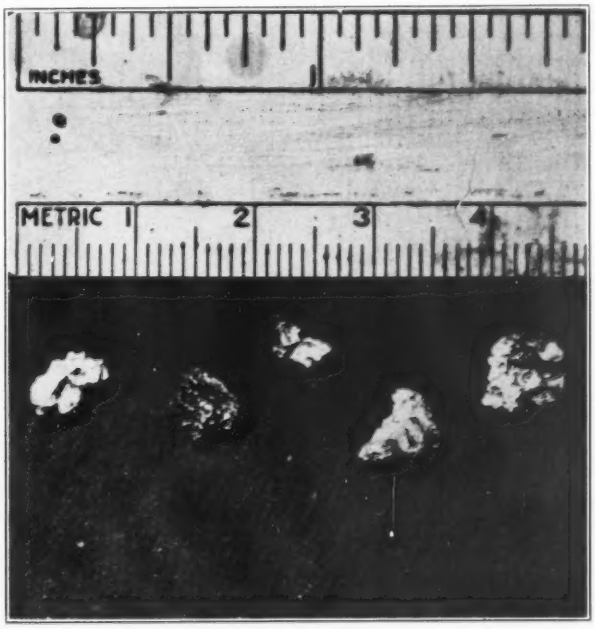

Fig. 12, Case 7

of mediastinal tumor. The chief complaints were: dyspnea, cyanosis, stridor, weight loss and anemia.

Upon examination it was found that she had indrawing of the suprasternal, supraclavicular and epigastric spaces. She had a stridor which could be heard at the door of her room. She was hoarse, the character of her voice resembling that heard in the presence of papilloma of the larynx. She was markedly emaciated.

Fig. 13, taken on June 8, 1935, shows a mass behind the level of the clavicle.

Fig. 14, taken on June 10, shows barium in the esophagus, with deviation of the barium around the tumor mass.

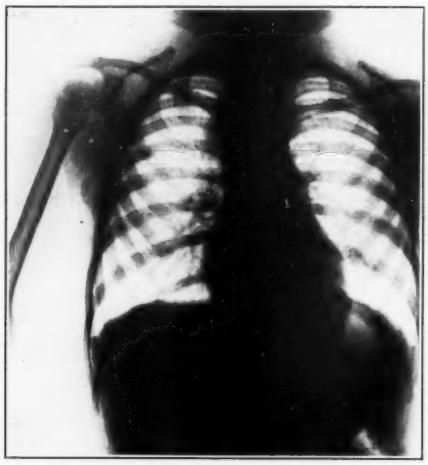

Fig. 13, Case 8

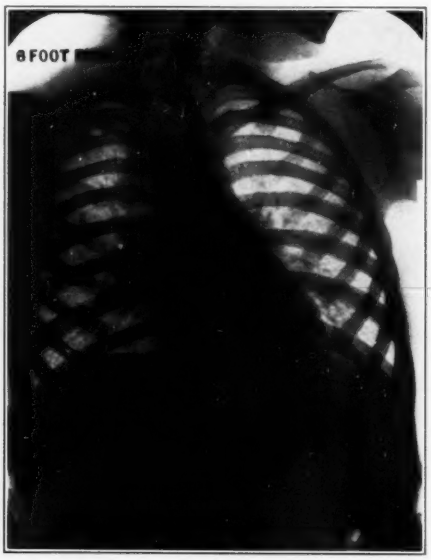

Fig. 14, Case 8

Fig. 15, taken on July 23, shows further disappearance of the mediastinal mass.

Because 85 per cent of such tumors are radiosensitive, it was decided to treat this tumor by radiation. Before beginning treatment, it was necessary to know the condition of the larynx and trachea. Direct examination revealed a normal larynx, but a very small semilunar-shaped lumen in the trachea at the level of the tumor.

In view of the probable increase in size of the tumor as the result of edema after irradiation and resultant increased pressure on the trachea with further diminished lumen, we were apprehensive for the child's safety because of increased respiratory difficulty. Since the site of the tumor was below the region reached by an ordinary tracheotomy tube, a Jackson's cane tube was kept at her bedside in readiness for immediate use if necessary.

There was some increase in difficulty with breathing, but by careful nursing we were able to avoid tracheotomy for the first week or so after irradiation. Then improvement in breathing occurred and soon she was out of danger.

After about six weeks the tumor had apparently entirely disappeared, and the child showed improvement in every respect. To date she has had no signs of recurrence.

Case 9.—C. B., aged 40, was referred to me by Dr. R. N. Holcomb, of Muskogee, Oklahoma, in August, 1934. His chief complaint was of hoarseness which began about seven months previously. Otherwise he was in good health.

Laryngeal examination revealed a mass projecting from the middle of the left vocal cord and confined to the vocal cord. It had an appearance typical of carci-

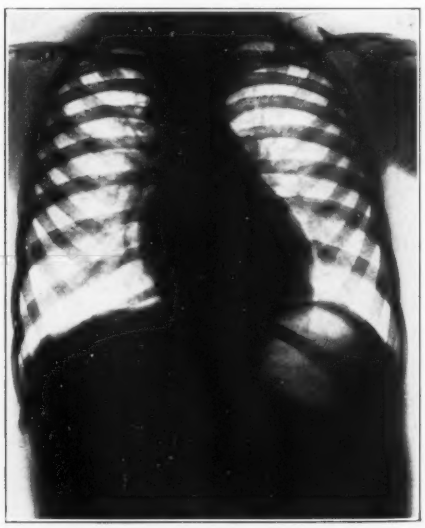

Fig. 15, Case 8

noma. Biopsy specimen was returned with a diagnosis of squamous carcinoma.

On August 24, 1934, the carcinoma was removed by laryngo-fissure according to Sir St. Clair Thompson's technic. The patient made an uneventful recovery and his course has pursued that usual in cases seen early enough to permit of treatment by this method. The percentage of cure in such cases is greater than 82.

It is important to keep in mind that cancer of the vocal cord if diagnosed while the lesion is still confined to the vocal cord may be treated by this method with the rate of cure as above stated and at the same time leave the patient with a serviceable larynx both for phonation and respiration.

A report on this case as late as December 14, 1936, shows that the patient is well, has no sign of recurrence, and is carrying on his occupation, that of an officer in the National Guards.

Case 10.—J. D., a white man, aged 60, came to the Out-Patient Department of the Washington University Medical Center November 6, 1930, with a complaint of a "lump" in his throat for six weeks, causing him to have difficulty in swallowing and necessitating frequent clearing of his throat. This had been going on for several months and he had been hoarse for a period of one week. He had no loss of weight and no pain. His history and physical examination except for the throat were negative.

Throat examination revealed a mass about one inch in diameter on the right rim of the larynx, involving the false cord and the arytenoid to the midline with fixation of the right arytenoid. The mass extended forward to the base of the tongue and into the right pyriform sinus, where there was a beginning ulceration. The mass was large enough to fill the pyriform sinus and overlie the larynx so that it was difficult to look into the glottic chink. The mass had the appearance typical of squamous carcinoma. This clinical diagnosis was concurred in by Dr. L. W. Dean, and numerous other members of the Department of Otolaryngology who saw the patient before treatment was instituted. Biopsy from the gland in the neck showed squamous carcinoma grade four.

The patient was sent to City Hospital for treatment by irradiation. Five gold seeds of two mc. each were implanted directly into the tumor on November 15, 1930, and he was given external radiation by the x-ray. Between November 15 and 18 he was given 1,050 r units on each side of the neck, with 200,000 kv., at 50 cm. distance, with filters one of copper and one of aluminum, 1 mm. each. Dr. E. R. Sante gave the radiation and prescribed the dosage of seeds, and he and Dr. H. M. Janse planted the seeds.

Careful laryngeal examination some three months after treatment failed to disclose any lesion of the larynx, except for a small region near the tip of the arytenoid which had somewhat the appearance of necrosis. Later this healed, and the patient has been seen from time to time with no sign of recurrence up to now.

During treatment the patient lost some weight and became somewhat anemic. He had some difficulty with movements of the tongue during this time. At the end of ten months he had made a complete recovery as far as one could see.

In view of the unusual result obtained, the question has arisen in our minds more than once as to whether or not the diagnosis was correct. The diagnosis has been verified by us as well as by others, and the opinion is unanimous that it was carcinoma.

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DUPLICATIONS OF THE ALIMENTARY TRACT*

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The term duplications of the alimentary tract is used in the hope of simplifying the nomenclature of these conditions, which has become somewhat confused. The terms in use at the present time to describe these abnormalities are enteric cysts, enterogenous cysts, diverticula, giant diverticula, ileum duplex, jejunum duplex, unusual Meckel's diverticula, and so forth. As all these names are used to describe the same condition though occurring in different situations, it would seem desirable to apply one inclusive name. Duplications of one part or another of the alimentary tract, though rare, are not too infrequent

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to interest the general surgeon, the general practitioner, the pediatrician, and particularly the surgeon concentrating in children's surgery.

As the basis of this paper, ten of these duplications occurring in recent years have been selected from the records of the general surgical service of the Children's Hospital. One of these cases has been previously reported by Mixter and Clifford[1] under the heading of mediastinal cyst and two by Hudson[2] entitled giant diverticula. The situations in which these duplications have occurred in this small series in the order of their frequency are: four in the ileum and one each in the stomach, duodenum (first part) jejunum (upper part), mediastinum, upper lobe of the lung, and tongue.

There are numerous theories which attempt in part to explain the occurrence of these cystic duplications. Among these theories may be mentioned alteration of Meckel's diverticula, twinning, affecting a certain section only of the embryo, and sequestration of a segment of the intestine. A plausible idea is that advanced by Lewis and Thyng,[3] who frequently found diverticula in the fetal alimentary tract of pigs, rabbits, cats, sheep, and man. These, they believe, developed from a "knob-like outpocketing of the intestinal epithelium." Their experience showed the most common location in animals to be the ileum, as this series suggests it to be in man. They also observed that these nodules might become separated from the alimentary tract or remain connected with it, which is exactly what is seen in man.

Grossly, these cysts are very variable in size as well as in location. The smallest one in this group occurred in the tongue and was the size of a filbert. The largest occurred on the posterior wall of the stomach and was three-quarters the size of that organ. Generally speaking these duplications, microscopically, are quite uniform. There is a mucous lining unless it has been destroyed as in two of the ten cases. Surrounding the mucosa in most instances is a thin layer of submucosa or connective tissue which in turn is surrounded by two layers of smooth muscle and this again by a serous coat (see chart). In two instances, that is, in the duplication of the stomach (No. 175979) and in the cyst of the terminal ileum which was detached, the lining of the cavity was apparently destroyed by intracystic pressure so that it could not be identified. The content of the cysts is a sticky mucoid fluid, chocolate or *café au lait* colored in some instances and almost colorless in others. The fluid has been sterile in some cases and in others contained pus cells and colon bacilli. A chemical analysis made in one instance (No. 180142) showed the fluid to be similar to the succus entericus found in an isolated loop of duodenum or upper ileum, namely:

Sodium	137	milli-equivalents per liter
Chloride	105	milli-equivalents per liter
Potassium	5.6	milli-equivalents per liter
Total nitrogen	558	mg. per cent
Protein	3.1	grams per cent

The symptoms caused by these duplications vary according to the size and situation of the

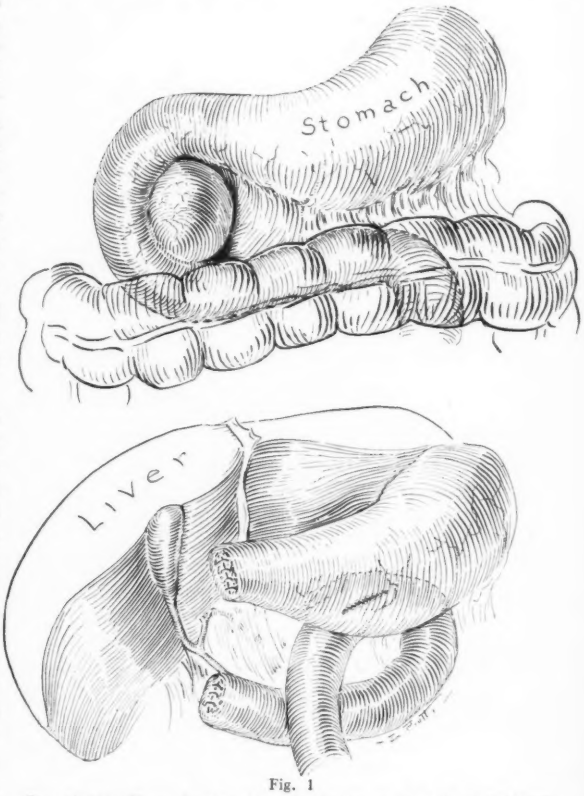

Fig. 1
Case 198767. Upper drawing shows duplication on left side of duodenum. Lower drawing, after excision and posterior gastrojejunostomy.

cyst. When the abnormality is in the chest it causes coughing, cyanosis or dyspnea. If it is in the abdomen, symptoms of pain, and of acute or chronic intestinal obstruction are evident. Hemorrhage from a peptic ulcer of the lining of the duplication may take place and be sufficiently profuse to be alarming or fatal. Perforation with the attending peritonitis has also occurred. A brief summary of some of the cases will perhaps clarify these points.

Case 198767.—This baby was admitted at the age of 5 weeks because of vomiting since birth. She had been born at full term by normal delivery and weighed 8 pounds 0 ounces. On the second day she vomited blood. This was diagnosed as hemorrhagic disease of the new born, for which she was treated by transfusions and blood given intramuscularly. During this period she had black, tarry stools. On the fifth day the symptoms of intestinal bleeding had disappeared. On the thirteenth day she was discharged from the maternity hospital weighing 7 pounds 8 ounces. The child did not do well at home in spite of the fact that she seemed to nurse well at the breast. She regurgitated a good deal and lost weight. Two days before admission to the Children's Hospital she began to vomit everything given by mouth and examination demonstrated an abdominal mass.

On admission this 35-day-old baby was dehydrated and poorly nourished. Her weight was 6 pounds 8 ounces. Her throat was slightly red and there were coarse *rhonchi* heard in both lungs. In the midline of the abdomen, just above the umbilicus, there was a freely movable, soft, cystic mass, measuring about 4 cm. in diameter.

Several diagnoses, including mesenteric cyst, omental cyst and enteric cysts, were considered before operation. By exploratory laparotomy a large enteric cyst of the upper duodenum was found (*Fig. 1*), which could not be dissected from the intestine (*Fig. 2*). Therefore the resection of the cyst, together with the first portion of the duodenum, was performed, followed by a posterior gastrojejunostomy. Following operation the baby's temperature fell to 95 degrees and then rose to above 103 degrees within the space of a few hours. Her condition was very precarious. A transfusion and parenteral fluids were given. A week after operation her temperature became stabilized and she took her feedings well. When she was discharged seven weeks after admission she had gained a pound and a quarter since operation.

Pathological Report. — The specimen consists of a portion of small intestine measuring 2.5 cm. in length and 1.5 cm. in diameter. Along the mesenteric border is attached a concave portion of a cyst wall measuring 4.5 x 3.5 cm. in greatest diameter. Submitted separately is another portion of the cyst wall measuring 4 x 4 cm. in greatest diameter. The serosa of the bowel is continuous with that of the cyst. It is smooth over the bowel; however, over the cyst there are numerous small tabs of fibrous tissue. Except for these, the serous surface is everywhere smooth, glistening and pale gray in color.

The lining of the cyst is dark pink in color and finely injected throughout. The intestinal mucosa is pale pinkish-gray in color and is slightly edematous. No patent opening between the cyst and intestine can be found. Sections are taken from the cyst wall, duodenal wall, and cyst and duodenal wall at their attachment. The material is fixed in Zenker's solution.

Microscopic.—In Section A of the cyst wall, the serosal surface is moderately edematous. The blood vessels are engorged and most of the perivascular areas are moderately infiltrated by polymorphonuclear cells, macrophages and lymphocytes. There are also numerous young fibroblasts. There is a well defined outer longitudinal and inner circular muscularis. The muscle fibers are well preserved. The inner surface is denuded of epithelium and is covered by a fibrinous exudate. The blood vessels of the submucosa are moderately congested and the connective tissue is infiltrated by polymorphonuclear cells and macrophages. There are also several secondary lymphoid nodules and an occasional group of mucous glands in this layer.

In Section B, duodenal wall, one section, the mucosa is thrown into the usual folds and is intact. The tunica propria and submucosa are edematous and contain a few small areas of recent hemorrhage. Brunner's glands are present in the usual number and appear normal. The serosa and muscularis are not remarkable.

In Section C, cyst and duodenal wall, the mucosa of the duodenal portion is as described above. Both the cyst and duodenum have definite separate muscular layers which are closely applied to each other and no plane of cleavage is seen. The mucosal surface of the cyst is lined by an epithelium similar to that of the

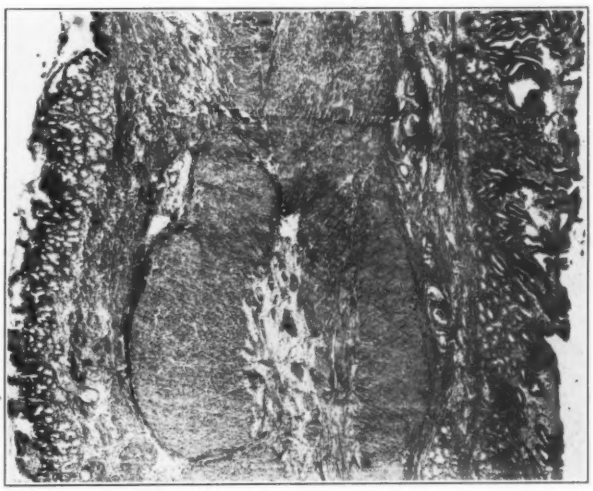

Fig. 2

Microscopic section through partition between duplication and duodenum. Shown in Fig. 1, Case 198767. Note mucosa of duplication to left, mucosa of duodenum to right, and muscularis forming wall between the two.

duodenum, but instead of deep folds and glands the surface here is broken only by shallow invaginations. There are, however, numerous Brunner's glands. The tunica propria is moderately infiltrated by polymorphonuclear cells and macrophages. The connective tissue is edematous and contains many proliferating fibroblasts. The mucosal surface is in some instances broken and here the tunica propria is very edematous and hemorrhagic. A well defined muscularis mucosa is present. The blood vessels are congested, but otherwise not remarkable.

The diagnosis is cystic duplication of duodenum with acute inflammation.

Case 168771.—This 6-months-old female infant was admitted to the Children's Hospital for the treatment of progressive abdominal distention and bilious vomiting of two weeks' duration. During this time she had been given daily enemata for constipation. For the four days before admission, the child had been feverish.

Examination showed an infant who appeared chronically ill. The abdomen was markedly distended and rigid, and tympanitic except in the right lower quadrant. Here there was palpable a firm, rounded mass about the size of a grapefruit. This mass could not be reached by rectal examination. The tumor was only slightly movable. Physical examination was otherwise negative.

Soon after admission the abdominal mass was difficult to palpate. X-ray examination showed free fluid and air in the peritoneal cavity, which was interpreted as being due to a ruptured viscus. Operation showed diffuse peritonitis and a large cyst attached to the jejunum. The duplication which had perforated, with about fourteen inches of jejunum, was resected and followed by a double-barrelled enterostomy of the Mikulicz type (*Fig. 3*). The child suffered considerable postoperative shock, but on the fourth day seemed to be in good condition. At this time it was evident that the great loss of fluid through the jejunostomy was rapidly dehydrating the child in spite of parenteral administrations of fluid. On the fifth postoperative day a small clamp was placed between the two loops of jejunum. On the seventh day the wound broke open and the abdominal contents eviscerated. The wound was resutured, but the child failed to survive.

Pathological Report.—The specimen consists of a segment of small intestine and associated mesentery, measuring 45 cm. in length. Lying within the leaves of the mesentery is a thick walled cone-shaped cystic mass measuring 22 cm. in length and tapering from a large dilated end, which measures 6 cm. in diameter, to the smaller end, which measures 2.5 cm. in diameter. At the tapered end there are two constricted areas 1.5 cm. in length with a lumen 3 mm. in diameter. At the distal end and between the constricted areas the lumen is dilated to a diameter of 1 cm.

The serosa of the jejunum is extremely congested, slightly dulled and several irregular areas of ecchymosis are present. The mucosal surface of the bowel is of a pinkish to brownish-gray color and presents the usual prominent plicae circularis of the jejunum. Approximately 15 cm. from the one end of the specimen and opposite the dilated portion of the cystic structure, there is an irregular depression in the mucosal surface which is smooth and measures 2 x 1.3 cm. No defect is present in this area.

The surface of the cystic structure is extremely congested and in places there are small accumulations of yellowish-brown fibrinopurulent exudate. The wall varies from 7-8 mm. in diameter. The lining is generally smooth and glistening, although extremely hemorrhagic in some areas. The most hemorrhagic portion of the lining is that of the dilated end. The color of the lining varies from pale yellowish-gray to pinkish-gray. An area of ulceration, 1 cm. in diameter, is present in the dilated portion. The serosa over this area is dull brownish-gray and congested. The wall at this point measures approximately 1 mm. in thickness, but there is no perforation.

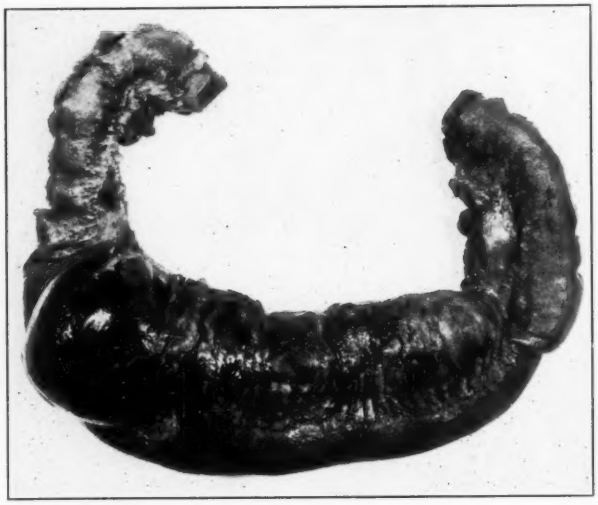

Fig. 3

Case 168771. Duplication of jejunum. Note that the duplication is on the mesenteric side of the normal jejunum and the consequent impossibility of dissecting out the cyst without destroying the blood supply of the jejunum.

Microscopic.—Ten sections were stained with hematoxylin and eosin, three sections stained with Giemsa, and three sections stained with phosphotungstic acid hematoxylin. The cyst is lined by a gastric type of mucosa. There are large open crypts, at the bases of which there are branching gastric glands containing parietal and chief cells. The stroma is edematous and the blood vessels are congested. Polymorphonuclear cells and macrophages are present in moderate numbers. Areas of ulceration are present and here there is a fibrinous exudate on the surface and the underlying submucosa presents a more marked inflammatory reaction than elsewhere. The portion of the wall taken from the smaller end of the cystic structure is lined by a mucosa, the epithelium of which is made up almost entirely of mucous glands. The submucosa is edematous and mod-

Fig. 4
Case 202899. Duplication of terminal ileum practically at ileocecal valve.

erately infiltrated by polymorphonuclear cells and macrophages. The connective tissue is increased and a moderate number of proliferating fibroblasts are present. The muscularis is of two thick layers with bundles of diagonally running smooth muscle fibers in addition. The serosa is edematous, congested and infiltrated by a variable number of lymphocytes, polymorphonuclears and macrophages. There is no exudate on the surface. A few of the blood vessels contain fibrin thrombi. The mucosa of the jejunum is well preserved and is free from inflammatory reaction. The submucosa, muscularis and serosa are moderately edematous. A section taken, including both the cyst and jejunum, shows the muscularis of each closely applied to the other with only a thin layer of adult connective tissue between them.

The lymph nodes included with the mesentery are moderately congested, otherwise not remarkable.

The diagnosis is cystic duplication of the jejunum with gastric type mucosa and acute and chronic inflammation.

Case 202899.—This 2-months-old female infant had suffered from vomiting and diarrhea for two weeks prior to admission. Immediately before entry she passed several bloody stools.

Examination showed a well-developed and nourished female infant who appeared to be in pain. There was a well defined mass in the right lower quadrant following the course of the cecum and ascending colon. It was believed that intussusception was the most probable diagnosis.

Soon after entry an exploratory laparotomy was performed, which showed a duplication of the terminal ileum, causing obstruction (*Fig. 4*). This was resected, together with the cecum and terminal ileum, followed by an end-to-end anastomosis. The day after operation the baby's temperature rose to 103°, but became normal on the second day, and from then on her convalescence was uninterrupted. She was discharged in good condition on the tenth postoperative day.

Pathological Report.—The specimen consists of the terminal ileum and the cecum with attached appendix. It includes 5.5 cm. of the ileum and 3 cm. of the cecum.

On the antero-medial aspect of the ileum near the mesenteric attachment there is a rounded mass projecting from the bowel and compressing the ileocecal area. It measures 5 cm. in diameter. The serosa is continuous with that of the ileum. It is pale pinkish-yellow, smooth and glistening. The smaller blood vessels are prominent.

The ileum is opened along the mesenteric attachment. The mucosa is injected, but uniformly intact except for a small area of ulceration 1.5 cm. proximal to the ileocecal valve, 1.5 cm. lateral to the mesenteric attachment. This ulcer has a raised pouting edge and a thinned muscularis at the base. No blood clot is present in this area. The muscularis of the ileum is approximately 1 mm. thick and merges with that of the cyst wall. The mucosa of the cecum is uniformly beefy red and is moderately edematous.

The cyst contains a clear watery mucoid material. The lining is smooth and whitish-gray in color. It is intact throughout and no communication with the bowel lumen can be identified. The wall is composed of a central gray layer 1 mm. in thickness and a serosa and lining as previously described. To gross examination the muscularis of the ileum is continuous with the central gray line of the cyst wall and where the wall of the bowel is approximated to that of the cyst these structures merge.

The appendix measures 7.3 cm. in length and arises at the junction of the two tenia. The serosa, mucosa and muscularis of the appendix are not remarkable.

Microscopic.—Three sections were stained with hematoxylin and eosin. The mucosa of the cyst is covered by a single layer of columnar epithelium. There are shallow glands of the type seen in the ileum. The tunica propria is edematous and the blood vessels are congested. The connective tissue is moderately infiltrated by macrophages and polymorphonuclear cells. The muscularis mucosa is well defined. The submucosa is very edematous and the blood vessels are markedly congested. There is a marked fibroblastic proliferation and a moderate number of polymorphonuclear cells and macrophages are present in the perivascular areas. The muscularis is well defined and is composed of an inner circular and outer longitudinal layer. As the cyst wall and ileum merge, the two longitudinal muscle coats are approximated and then the muscle coat of the cyst and bowel merge to form a single circular layer of smooth muscle.

The mucosa, muscularis and serosa of the ileum are edematous and the blood vessels congested, but there is no inflammatory cellular infiltration. The secondary lymphoid nodules are not remarkable. No mucosal ulcerations are seen in the ileum.

The mucosa and muscularis and serosa of the colon present edema and vasocongestion similar to that described in the ileum .

The diagnosis is cystic duplication of the terminal ileum and ulceration of the ileum.

Case 180142.—This 19-months-old child had always had difficulty in retaining food. A few months before admission he began having attacks of vomiting every

ten days to two weeks. He was constipated enough to be given daily cathartics. For three weeks previous to admission he had not vomited, but was taking liquid food only.

The child was pale and somewhat under weight. The abdomen was not distended and there was no tenderness or muscle spasm. In the right side there was a freely movable mass extending from the brim of the pelvis to the border of the liver. X-ray examination of a barium enema showed the cecum in the midline just below the xiphoid.

At operation the cecum and appendix were found in the right upper quadrant. The right side of the peritoneal cavity was occupied by a large mass which on examination was found to be a completely detached loop of bowel with both ends bound by adhesions, the upper end to the liver and gallbladder and the lower end extending down to the brim of the pelvis in the midline. The adhesions from the gallbladder and liver were freed when this loop of bowel was found to have a mesentery of its own attached to the mesentery of the ileum about four inches from the ileocecal valve. The blood supply was tied and cut and the specimen removed (*Figs. 5* and *6*). The rest of the intestinal canal was examined and except for the malrotation and abnormal mesenteric attachments, nothing abnormal was found.

Pathological Report.—The specimen consists of a sausage-shaped mass measuring 15.5 cm. in length and varying from 4-5 cm. in diameter. Along one margin is a very definite mesenteric border. The external surface is pale gray in color with local areas of hemorrhagic discoloration. On opening the mass approximately 160 c. c. of thick, sticky, mucoid, *café-au-lait* colored fluid escapes. The internal surface is smooth, glistening and pale grayish-white in color except for an area 1 cm. in diameter, in which there are a few hemorrhagic spots. Across one end a number of valve-like structures, reminiscent of the valvulae conniventes, are found.

Microscopic.—Nine sections were prepared, five stained with hematoxylin and eosin, two with phosphotungstic acid hematoxylin, and two with aniline blue. The epithelium is very poorly preserved and in all but one section is not present. It is variable in type from a simple

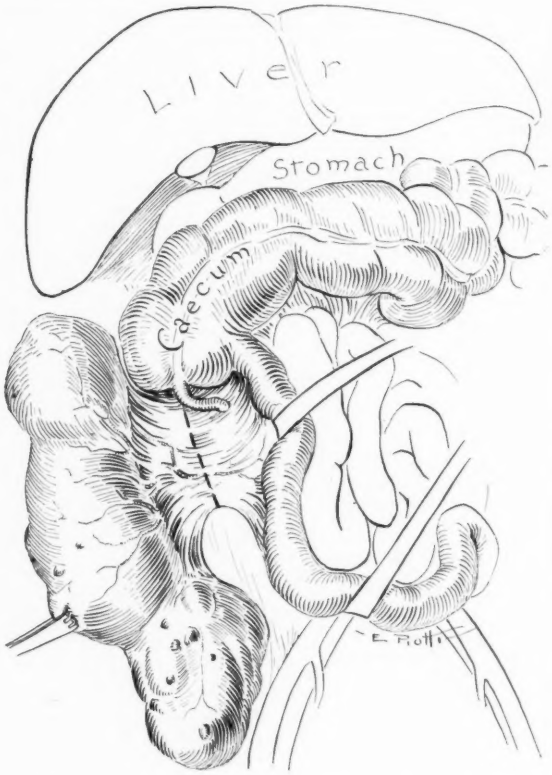

Fig. 5

Case 180142. Diagram to show position and attachment of duplication of terminal ileum. A blind pouch with a mesentery of its own springing from the mesentery of the ileum.

Fig. 6

Case 180142. Photograph of specimen of detached duplication of terminal ileum.

non-ciliated columnar epithelium to a pseudostratified columnar epithelium and a ciliated type. In no field is there evidence of gastric or intestinal mucosa. The tunica propria is thin and cellular. Both this layer and the epithelium are infiltrated by a moderate number of polymorphonuclear leukocytes. The submucosa is slightly edematous and the vessels are congested. The tunica muscularis is greatly thickened. This is true of both the circular and longitudinal elements. The thickening is due to hypertrophy of the muscle fibers. The serosa is moderately edematous and the vessels are dilated and engorged, but there is no evidence of inflammatory changes. Large collections of foam cells, presumably containing cholesterol, are seen.

The diagnosis is unattached cystic duplication of the bowel with hemorrhage.

So far as I know, a correct preoperative diagnosis has never been made in a case of duplication of the alimentary tract. It would seem, however, that with further experience, a correct diagnosis might be suspected moderately often. Almost the same situation existed a comparatively few years ago with respect to Meckel's diverticulum. Yet today a correct diagnosis in this condition is made in a fair percentage of the cases. The diagnoses which have been thought of where the duplication is situated in the abdomen in these few cases have been Meckel's diverticulum, intussusception, intestinal obstruction, mesenteric and omental cysts.

In the seven cases in which the duplication occurred in the abdomen, vomiting was a prominent symptom in all. Mild pain or abdominal discomfort was present in all and undernourishment or feeding difficulties were usually a part of the picture. Blood was observed in the stools in three of the seven cases. This blood may come from a peptic ulcer next to misplaced gastric mucosa in the duplication lining, or from congestion of the intestine by pressure of the cyst. On physical examination a tumor was felt in six of the seven abdominal cases. In the seventh instance, it was masked by general abdominal distention. The x-ray examination of the patients has not been particularly helpful except for showing free air in the peritoneal cavity, denoting perforation in one case, pressure on the stomach and colon in one instance and partial obstruction in two cases (*Fig. 7*).

As a result of experience, therefore, it would seem that duplication of the alimentary tract should be considered in a child suffering from symptoms of partial intestinal obstruction in whom an abdominal tumor may be felt. When blood is found in the stools and the symptoms are less acute than those of intussusception or the tumor is larger than one would expect in a

DUPLICATIONS OF THE ALIMENTARY TRACT

Case No.	Age	Position of Cyst	Attachment	Muscle Layers	Type of Mucous Membrane
120859		Tongue	Tongue	Circular and longitudinal	Colonic
118048	11 months	Right lung, upper lobe	Lung	Circular and longitudinal	Gastric
113795	2 years	Mediastinum	Mediastinum	Circular and longitudinal	Gastric
175979	7 years	Reduplication of stomach	Posterior wall of stomach	Circular and longitudinal	Lining necrotic. No mucous membrane could be identified
198767	5 weeks	Duodenum first part	Left border of duodenum	Circular and longitudinal	Duodenal
168771	6 months	Upper jejunum	Mesenteric	Circular and longitudinal	Gastric
153126	2 years	Ileum	Mesenteric border of ileum	Circular and longitudinal	Gastric
202899	2 months	Terminal ileum	Mesenteric border of ileum	Circular and longitudinal	Ileal
180142	19 months	Terminal ileum	Mesentery of terminal ileum	Circular and longitudinal	No evidence of gastric or intestinal mucosa
160933	12 days	Terminal ileum	Mesenteric border of ileum	Circular and longitudinal	Ileal

Fig. 7
Case 175979. X-ray of barium meal showing pressure indentation of duplication on stomach.

case of Meckel's diverticulum, duplication of the intestine should be strongly suspected.

The treatment of these conditions is of course surgical and on account of the dangers from obstruction, perforation, or hemorrhage, the operation should not be unduly delayed. It is a temptation for the surgeon who meets one of these cases for the first time to attempt to dissect the duplication away from the normal intestine. This is unwise except in the event of the duplication's being detached from the normal intestine. *Figs. 2* and *3* make it apparent why this procedure is impractical. The blood supply of the normal bowel is distal to that of the duplication so that if one dissects out the duplication the blood supply of the bowel is destroyed. Also there is no line of cleavage between the normal intestine and the cyst and the partition is thin and composed of only the mucosa and muscle layers. An attempt to separate the two would be very difficult if not impossible without perforating the normal. It has been suggested that the mucous membrane only of the cyst might be dissected out or destroyed. This might be feasible in some instances, but has not been attempted in our cases. Resection of the duplication with that portion of the normal bowel to which it is attached is therefore usually the operation of choice. In small infants this is to be followed by a side-to-side anastomosis. In the older patients an end-to-end anastomosis could be substituted.

In this group of ten cases the type of operation and the results obtained were as follows. The colonic cyst of the tongue was excised. The gastric duplication in the mediastinum was marsupialized first and later excised successfully. In the gastric duplication of the lung an unsuccessful attempt was made at excision and the child subsequently died of pneumonia. In the case of duplication of the stomach situated on the posterior wall of that organ, the cyst was marsupialized and as the lining membrane had been destroyed by intracystic pressure it collapsed and became very quickly adherent to itself. The symptoms have been entirely relieved and should stay so unless there is some intact mucosa which was not seen and which might secrete again and cause a recurrence. Of the remaining six cases, three who had a resection with the normal adjacent bowel and immediate anastomosis all recovered. One duplication which was separate from the normal bowel was excised uneventfully, with recovery. A patient who had acute obstruction with perforation and peritonitis died subsequent to a resection with enterostomy. A patient in whom an attempt at separating the duplication from the normal bowel was unsuccessfully made at the first operation died after a resection of about two feet of ileum at a second operation. Thus seven of these ten patients suffering from duplication of the alimentary tract have been relieved and three have died.

In conclusion, it seems fair to state that these duplications occur more frequently than has been supposed. There have been ten cases at the Children's Hospital in the space of very few years, and I know of a few others occurring in other hospitals in this same period. This condition should not be confused with the pulsion diverticula occurring in elderly people so well described by Edwards,[4] or with Meckel's diverticula, or with mesenteric or omental cysts. The pulsion diverticula are acquired diverticula which might be defined as a herniation of the mucosa of the intestine through its wall. The Meckel's diverticula are the result of an arrest in the normal embryologic development with the vitelline duct persisting. Mesenteric and omental cysts are of lymphatic origin and it seems to me con-

fusing to group these with the Meckel's diverticula or duplications, as was recently published in an abstract of a paper by Erb,[5] of Toronto. These duplications are the result of an abnormal development.

The patients should be subjected to operation for relief. The operation in the majority of instances should involve a resection of the duplication with its adjacent bowel rather than an attempted excision of the cyst itself. When the operation is undertaken prior to the occurrence of infection, perforation, or severe hemorrhage, the risk is not great and the results are gratifying.

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ELECTROCARDIOGRAMS SIMILAR TO THOSE OF CORONARY THROMBOSIS WITH ESPECIAL REFERENCE TO THOSE OBTAINED IN PULMONARY INFARCTION*

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It is being increasingly recognized that electrocardiograms similar to or suggestive of those obtained from patients suffering with coronary thrombosis can be present in other conditions. For example, such tracings have been reported in cases of rupture of the heart,[1] gumma of the heart,[2] rupture of an abdominal aneurysm,[3] rupture of dissecting aneurysms into the pericardium or pleura;[4] also in numerous conditions deviations from normal in the ST segments and T-waves have been noted. Long since, it has been commented upon that considerable difficulty may be experienced at times in differentiating pulmonary embolism or infarction and seizures of angina pectoris or coronary occlusion. More recently, the close similarity of the electrocardiograms recorded during the earlier hours of certain cases of lung infarction and those obtained in the T-3 type of coronary thrombosis has been described. Because of the frequent similarity of symptoms in these two conditions, it becomes even more important to determine electrocardiographic differences if such differences exist, for if embolectomy be considered, one certainly does not wish to operate upon a case of coronary thrombosis, and on the other hand the grave prognosis of coronary thrombosis and frequent consequent drastic curtailment of activities should assuredly not be applied to a patient suffering from pulmonary embolism.

McGinn and White[5] and Barnes[6] are in close agreement that the essential differences between the electrocardiogram of acute pulmonary embolism and that of acute coronary thrombosis of the T-3 type are as follows:

(1) S-1 is rather constantly present in pulmonary infarction and apt to be wide, whereas it is usually absent in coronary thrombosis.

(2) ST-2 is not elevated and is usually depressed in the former, usually elevated and never depressed in the latter.

(3) T-2 is low, diphasic, or slightly inverted in lung embolism, definitely inverted in coronary thrombosis.

(4) T-3 is inverted in both conditions.

(5) The Wolferth fourth lead (chest lead with right arm electrode anterior, left posterior) shows T-waves usually upright in embolism of the lung, whereas they are normally inverted in the T-3 type of coronary curve.

(6) White also points out a tendency to right axis deviation in pulmonary infarction.

Of seven patients definitely diagnosed as having pulmonary infarction, in whom electrocardiograms were obtained shortly after the embolism or pulmonary thrombosis had occurred, four presented records which were suggestive of the coronary type of curve. A fifth case revealed marked depression of the ST segments in leads 1 and 2 without significant alterations in the T-waves. One other case with proven syphilitic occlusion of the coronary ostia revealed, following thrombosis and infarction of both lower lobes of the lungs, no further aberrations in a tracing already presenting abnormal ST segments and T-waves. Thus in two of the seven cases there were no significant electrocardiographic changes following pulmonary infarction. An analysis of the five electrocardiograms exhibiting such aberrations reveals the following:

(In recording chest leads in this laboratory we do not follow the Wolferth method of placing the right arm electrode anteriorly and the left posteriorly, for to my

*Read in General Clinical Session, Southern Medical Association, Thirtieth Annual Meeting, Baltimore, Maryland, November 17-20, 1936.

*From the Department of Medicine, University of Maryland.

mind this leads to a confusing terminology. We reverse this procedure and lead with the right arm electrode posterior and the left anterior, since this gives records similar to those obtained by the routine leads and no confusion of terminology results.)

(1) S-1 is present in only two of five cases.

(2) ST-1 is depressed in two cases, elevated in none.

ST-2 is depressed in three cases, elevated in none.

ST-3 is elevated in two cases, depressed in none.

ST-4 is elevated in two cases, depressed in one case, and not altered in three.

(3) T-2 is inverted in no case, flattened or not readable in two cases, and is upright in the remainder.

T-3 is definitely inverted in four cases.

T-4 is inverted initially in two cases, became inverted in one more, and remained upright in two cases.

T-3 and T-4 are inverted concurrently in three of the five cases.

(4) Q-waves are present in lead 2 in one case, and in lead 3 in two cases.

In this analysis of records the findings unusual to cases of coronary thrombosis of the T-3 type are the frequent depression of the ST segments in lead 2 and the concurrence of T-3 and T-4 inversion. We have seen, however, records with T-3 and T-4 inversion in coronary disease. ST-2 depression in the T-3 type of coronary curve has also come to our attention, although it is certainly unusual. Levine[7] publishes such a tracing on page 420 of his recent book.

CASE REPORTS

Case 1.—W. M., 72, had arteriosclerotic cardiovascular disease and auricular fibrillation. There was sudden breathlessness and sense of oppression in the chest, hemoptisis, fever and leukocytosis. X-ray diagnosis was made of infarct in the base of the left lung. Electrocardiogram (*Fig. 1*) shows marked depression of ST-1 and ST-2 (no digitalis).

Case 2.—W. M., 55, had an exploratory laparotomy and release of adhesions on October 8, 1935. Ten days later there was severe precordial pain and a precordial friction rub; the patient became pallid, slightly cyanotic, and dyspneic. There were rales in the left base. The electrocardiogram is shown in *Fig. 2a*. Four days later there was a repetition of this attack; however, there was no friction rub this time, and by now there was evidence of localized consolidation in the left base and impairment and rales in the right base. Six days later the patient was x-rayed and a typical infarct was present in the base in the left axillary region. In the electrocardiogram (*Fig. 2b*) T-4 has now become inverted.

Case 3.—W. F., 56, had a cholecystectomy on October 20, 1935. Five days later there occurred stabbing pain in the chest, cyanosis and collapse. Death occurred five hours after onset. The electrocardiogram is shown in *Fig. 3*. Autopsy revealed a large thrombus in the orifice of the right pulmonary artery. There were slight atheromatous lesions throughout the coronaries.

Case 4.—W. F., 22, on the tenth day after cesarean section developed sudden pain in the left lower chest, fever, hemoptysis and physical signs of infarct. X-ray showed clouding of the left base. On the twelfth day her temperature was normal. Electrocardiogram is shown in *Fig. 4*.

Case 5.—W. F., 25, with an infected abortion, entered the hospital August 2, 1936. Five days later her respiration became rapid and a friction rub developed at the left base. X-ray revealed a prominent pulmonic conus, clouding of the base of the left lung with elevation of the diaphragm, the heart and mediastinum displaced to the left, and infiltration of the lower lobe of the right

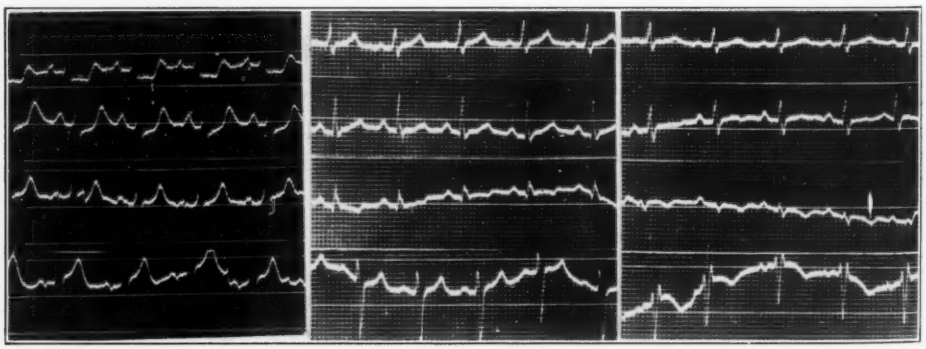

Fig. 1 Fig. 2a Fig. 2b

Fig. 1, Case 1, pulmonary embolism. Marked depression of ST segments in Leads I and II.
Fig. 2a, Case 2, pulmonary embolism. S-1 present. T-3 inverted.
Fig. 2b, Case 2, four days after Fig. 2a. T-4 has now become inverted.
(All chest leads taken with right arm electrode posterior, left arm electrode anterior, reverse of Wolferth procedure.)

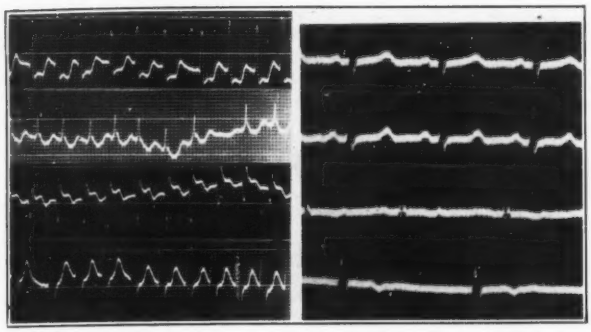

Fig. 3 Fig. 4

Fig. 3, Case 3, pulmonary infarction, auricular fibrillation. Marked depression of ST-1 and ST-2, deep Q-3, ST-3 elevated, late inversion of T-3, T-4 upright.

Fig. 4, Case 4, pulmonary infarction. T-3 and T-4 inversion.

(All chest leads taken with right arm electrode posterior, left arm electrode anterior, reverse of Wolferth procedure.)

lung. Electrocardiograms are shown in *Fig. 5*. Autopsy September 23, 1936, revealed multiple infarcts of both lungs, lung abscess of the right lower lobe, subdiaphragmatic abscess, right, and purulent pericarditis.

Scherf and Schonbrunner[8] report a number of cases diagnosed clinically as pulmonary infarction, in which electrocardiograms were made. In one case they show ST-1 depression, T-1 inversion, and elevation of ST-2 and ST-3. Another case reveals ST-1 elevated and ST-2 and ST-3 below the base line. Two cases show depressions of ST-1 and ST-2 and one case fits the criteria of White and Barnes. Other cases showed flattening of the T-wave in leads 1 and 2, later returning to normal.

It will be noted that of our five cases only one (second tracing on Case 2, Fig. 2b) rather definitely meets all of the requirements of Barnes[6] for the diagnosis of pulmonary embolism. There is one (Case 3, Fig. 3) which we could not differentiate from the T-3 type of acute coronary thrombosis, and one (Case 5, Fig. 5) very similar to the T-3 type of coronary curve, but revealing T-4 inversion as well as negative T waves in lead 3. From the above observations we cannot conclude at this time that there is an electrocardiogram that is typical of pulmonary infarction. Certain aberrations from the normal, perhaps, occur more frequently than others. These are depression of the ST segments in lead 2, often in conjunction with changes in lead 3 suggesting the T-3 type of coronary curve, and further the occurrence of T-3 inversion concurrently with an upright T-4 (Wolferth chest lead) or an inverted T-4 when the right arm electrode is posterior and the left anterior. It has been shown that these findings may occur in other types of disease process, including coronary disease. Tracings published by Osgood *et al*[4] obtained from cases of dissecting aneurysm are quite similar to certain curves obtained in lung embolism. We do not feel that the electrocardiogram can at present be considered decisive evidence in differentiating lung infarction from coronary thrombosis. The history, physical findings and x-ray findings must be taken into the consideration in any given case. Dr. Brugler and I are interested in discovering what causes the above electrocardiographic changes in cases of infarct of the lung and are at present conducting investigations to this end. We are not prepared at present to draw any conclusions from the experiments performed so far, but we believe that the parts played by mechanical obstruction to the pulmonary circulation, anoxemia of the heart muscle, reflex changes in the coronary circulation, and the pre-existing state of the coronary arteries must be taken into consideration.

Other interesting records which more or less resemble those derived from patients suffering with coronary disease have been obtained in the following cases:

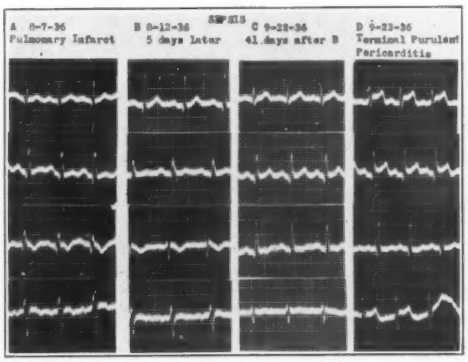

Fig. 5

Fig. 5, Case 5 (a) Pulmonary infarction. Deep Q-3. ST-3 and ST-4 elevated. T-3 and T-4 inverted.
(b) Five days after (*a*). T-4 no longer inverted.
(c) Forty-one days after (*b*). Tracing essentially normal.
(d) One day later. Purulent pericarditis, marked elevation of ST-1 and ST-2.

(All chest leads taken with right arm electrode posterior, left arm electrode anterior, reverse of Wolferth procedure.)

Case 6.—W. F., 12, had congenital heart disease with cyanosis (*Fig. 6*).

Case 7.—C. F., 39, had sudden onset of congestive heart failure, rapidly progressing. Her heart was grossly dilated; there were no murmurs. Blood pressure was 130/90, Wassermann 4 plus. She remained ambulatory and received digitalis and cautious antiluetic treatment. Digitalis was discontinued in one month, but antiluetic treatment is still being received. The patient returned to work and has been so engaged since without recurrence of symptoms. This tracing (*Fig. 7*) is quite similar to that obtained in a case of gummatous myocarditis reported by Reifenstein,[2] and the same diagnosis must be considered.

Case 8.—C. M., 46, was admitted to the surgical service with a stab wound above and a little inside the left nipple. Electrocardiogram (*Fig. 8*) 24 hours after the accident revealed high cove-planed ST segments in leads 1 and 2, in lead 2 similar to a monophasic curve. ST-3 was slightly elevated and T-3 upright. ST-4 was well above the base line. The patient died one week later and autopsy revealed a small penetrating wound of the right ventricle and a purulent pericarditis.

Case 9.—W. F., 26, had a gunshot wound of the left chest, hemothorax, and probable injury to the heart and pericardium. The patient died 20 hours after admission. There was no autopsy. Electrocardiogram (*Fig. 9*) showed Q-2 and Q-3 present. ST-1 was depressed, ST-2 and ST-3 were elevated and convexly arched. T-3 was inverted.

Case 10.—W. F., 20, experienced postoperative massive collapse of the right lung. The patient recovered. Electrocardiogram (*Fig. 10*) showed right axis deviation, elevation of ST-1 and T-1 inversion. The curve returned to normal in four days.

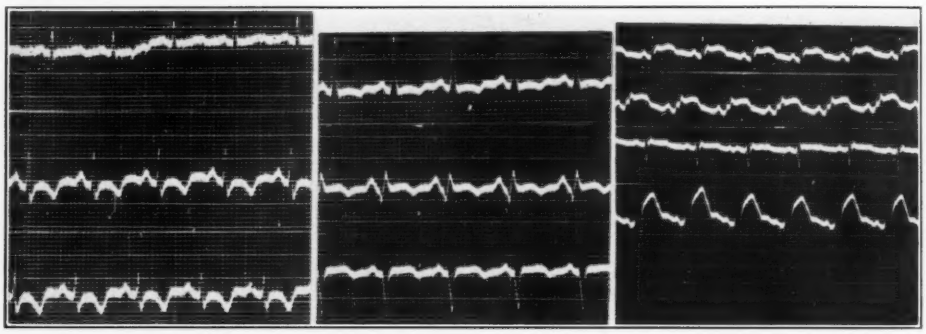

Fig. 6 Fig. 7 Fig. 8

Fig. 6, Case 6, congenital heart disease. Marked convexity of ST-2 and ST-3. T-2 and T-3 deeply inverted.

Fig. 7, Case 7, syphilitic myocardial disease. Q-2 and Q 3 are deep. ST-1 convex, ST-2 and ST-3 convex and somewhat above base line. T-waves inverted.

Fig. 8, Case 8, stab wound of right ventricle. Pericarditis. Marked elevation of ST-1, ST-2, ST-4.

(All chest leads taken with right arm electrode posterior, left arm electrode anterior, reverse of Wolferth procedure.)

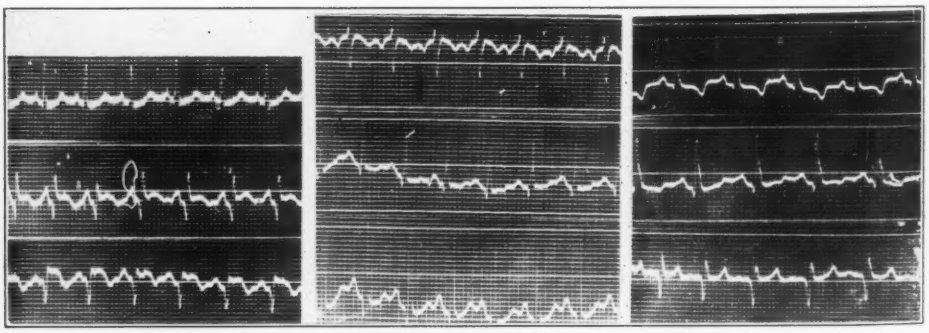

Fig. 9 Fig. 10 Fig. 11

Fig. 9, Case 9, gunshot wound of left chest. Hemothorax. Probable pericarditis. Deep Q-2 and Q-3. ST-2 and ST-3 elevated. Late inversion of T-3.

Fig. 10, Case 10, massive collapse of lung. Deep S-1 and right axis deviation. ST-1 elevated and T-1 inverted.

Fig. 11, Case 11, rupture of dissecting aneurysm into pericardium. Q-2 and deep Q-3. T-1 and T-2 inverted.

(All chest leads taken with right arm electrode posterior, left arm electrode anterior, reverse of Wolferth procedure.)

Case 11.—W. M., 45, had a dissecting aneurysm of the aorta rupturing into the pericardium. Death occurred 12 hours after admission. Autopsy was done. Electrocardiogram (*Fig. 11*) showed deep Q-3, T-1 and T-2 inverted.

It seems obvious from the foregoing case reports and electrocardiograms that the greatest caution should be exercised by the cardiologist in interpreting electrocardiograms without being fully familiar with all facts pertaining to the patient's illness.

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TUMORS OF THE CHEST WALL*

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Baltimore, Maryland

With the great number of structures making up the chest wall, all varieties of tumors may be expected. However, as compared with tumors found in other parts of the body, those of the chest wall are relatively few in number if we leave out metastatic tumors and those of the breast and superficial tumors of the skin. These tumors have been grouped pathologically. Some groups have been carefully worked out and are fairly well understood, while others are in the formative stage of study and classification. In the literature are found numerous reports of cases and of these, probably Hedblom's and Heuer's have been the most complete, with classification and description of their own and their collective cases. Suffice it to say that over 50 per cent chest wall tumors are sarcoma and about 10 to 15 per cent chondroma, with the rare cases making up the difference.

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Early thoracic surgery was at times very crude. When one reviews the older literature one is impressed both by the daring of the surgeon and the fortitude of the patient. This makes fascinating reading, but I cannot take time here to enlarge on this subject. I refer you to an excellent article by John Alexander in the *Journal of Thoracic Surgery* (Vol. 5, No. 1). Today many lesions of the chest wall can be removed by surgery with the aid of improved anesthesia as well as improved surgical technic. The increased interest shown in thoracic surgery at the present time, I feel, is due largely to the American Association of Thoracic Surgery. This Association was started in 1918 by a small group of physicians interested in this branch of surgery and has now become a strong organization with annual meetings and supporting the *Journal of Thoracic Surgery* with a registry of chest tumors.

It is my desire now to show several cases which are similar in type. These four cases have been selected from our collection of chest wall tumors of the endothelial type, and we now have twenty-five such cases in the Surgical Pathological Laboratory. All of these cases involve the pleura; their histories, examinations and the gross pathology are similar, and their microscopic pictures show variations of the endothelial group.

The general symptoms of a mass in the chest wall, pain in the chest, loss of weight, cough, cyanosis, although present in all four, may not be found in other cases similar in pathology. Sometimes the mass is found during a routine examination for other symptoms. A small tumor is frequently difficult to locate, but today with our use of x-ray, the bronchoscope, thoracoscope and bronchograph, we can make a fairly accurate diagnosis in chest conditions. The differential diagnosis of tuberculosis, fractures of the rib, or abscesses, may all complicate the picture. In a few cases a biopsy may be necessary to establish the diagnosis.

Case 1 (No. 38568).—The patient was a white woman, aged 22 years, who was married and had one child 11 months old. The child nursed until nine days before admission to the hospital. Four months before admission the patient noticed pain in the upper quadrant of the left breast and later a lump appeared which was increasing in size.

Examination of the chest showed a scar on the left side near the midline. There was a history of a fall at 7 years of age resulting in a blue spot which remained until four years previously. She received another injury in an automobile accident. Infection followed, incision and drainage were instituted, leaving a scar.

The breasts were normal looking and were of the lactating type. The right side of the chest was normal. On the left side, beneath the breast, towards the axillary line, a bulging mass was seen and felt. It was attached to the ribs and was hard, but the soft tissues moved freely over it. The heart was normal in size, sounds were clear, blood pressure was 120/80. The lungs showed that expansion lagged on the left side and the percussion note was hyper-resonant on the left side from the second rib down throughout this side. Auscultation was clear throughout. The thyroid was slightly enlarged. X-ray showed a mass involving the fourth and fifth ribs, extending from its base in the left axilla into the pleural cavity, with the apex in the region of the left hilus.

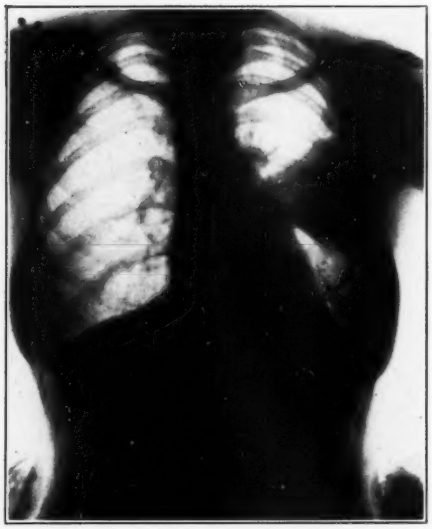

Fig. 1
(38568) X-ray of the chest showing cone-shaped tumor mass extending into chest cavity.

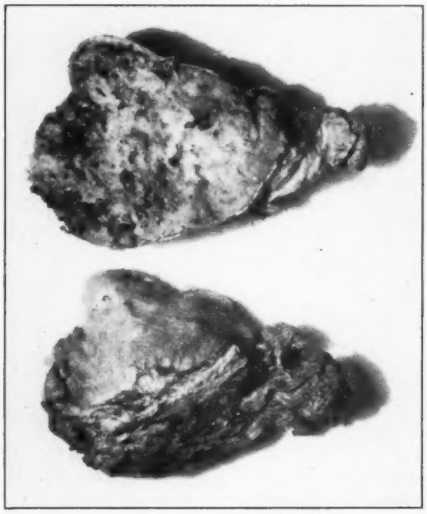

Fig. 2
(38568) Gross specimen. A cone-shaped mass is attached to the ribs involving the pleura, showing cartilage, new bone and tumor cells.

Operation.—Instead of attempting to remove the mass at one operation it was decided to operate in stages.

(1) Resection of the third, fourth and fifth ribs in the mid-axillary line.

(2) Exposure of the third, fourth and fifth ribs of the anterior sternocostal articulation.

(3) Resection of the above ribs exposed in 2.

(4) Soft tissue raised in flap over the tumor mass.

(5) Start of complete removal, discontinued on account of patient's condition.

(6) Complete removal of tumor mass.

All of these operations were done under procaine hydrochloride anesthesia with the exception of the last two, which were done under oxygen nitrous oxide. In all of these operations there was a rapid rise in pulse rate, due perhaps to a thyroid condition, although the basal metabolic rate was normal.

At the last operation the skin flap was raised, ribs freed at the resected ends, chest cavity opened, and the whole mass removed in block. There was very little collapse of the lung under gas anesthesia with pressure. The pericardium was free, but the lung was adherent to the tip of the tumor mass. There was no evidence of metastasis to the lung. The skin flap was sutured in place over the chest wall defect. There was an uneventful postoperative recovery with perfect healing.

The tumor was a cone-shaped mass involving the rib and pleura. Bisection showed a mass composed of cartilage, new bone, tumor cells, apparently sarcomatous in nature.

Microscopic examination showed areas of new bone

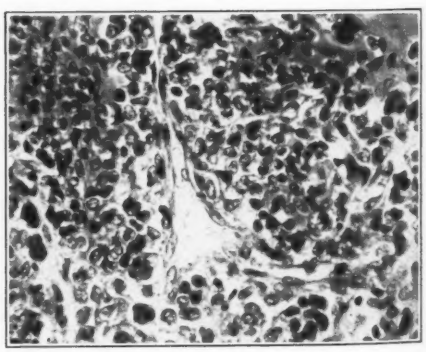

Fig. 3
(38568) Microscopic. Shows increased vascularity, proliferation of endothelial cells and cartilage cells, and area of new bone formation.

formation, cartilage, increased vascularity, epithelial proliferation and a spindle cell type of sarcoma cell.

The diagnosis was osteo-chondrosarcoma of the endothelial type (*Figs. 1, 2, 3*).

The patient left the hospital in good condition, was gaining in weight, and on returning home was able to resume her household work. Two years after operation, however, metastatic lumps appeared in the chest wall and neck, resulting in death with widespread metastases.

Case 2 (No. 30912).—The patient was a white female, aged 48 years and married, with three children. The duration of her symptoms was two years. There was pain in the right chest and arm which was followed in about three months after the first attack by a small lump which at the time of examination was about the size of a walnut. Acute attacks of pain recurred with free intervals. She was given x-ray treatment without any change in condition. X-ray showed a mass in the right chest wall in the median axillary line, at about the level of the fourth, fifth and sixth ribs, which extended intra-thoracically but seemed to be extra-pleural.

Operation.—Under ether anesthesia portions of the third, fourth, fifth and sixth ribs were removed with the tumor. The pleural cavity was not entered, but the entire mass was peeled off from the parietal pleura. The skin was closed over the denuded area. Hemorrhage was free, but was controlled with clamps and pressure. The operation took three hours and the patient died within twenty-four hours from surgical shock.

This specimen showed a rounded tumor mass bulging from the ribs both anteriorly and posteriorly into the pleural cavity. It surrounded two ribs and was removed with portions of the adjacent ribs. It seemed to be encapsulated. The color was white with here

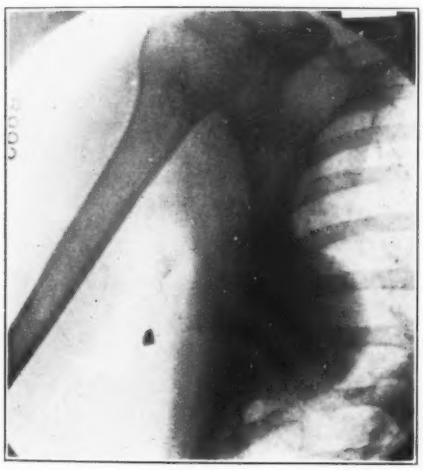

Fig. 4

(30912) X-ray of the chest wall showing rounded mass extending into the pleural cavity and attachment to the ribs.

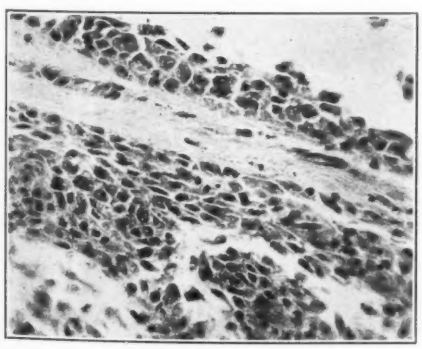

Fig. 6

(30912) Microscopic. Shows a very cellular tumor, fibrous stroma with endothelial cells predominating.

Fig. 5

(30912) Gross specimen showing ball-shaped mass involving ribs and pleura. Bisection of a small area of necrosis and hemorrhage in a friable, very cellular tumor mass.

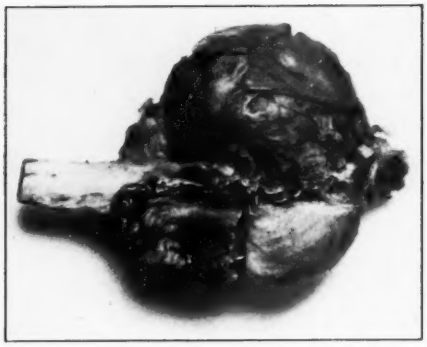

Fig. 7
(29102) Tumor mass involving rib and pleura.

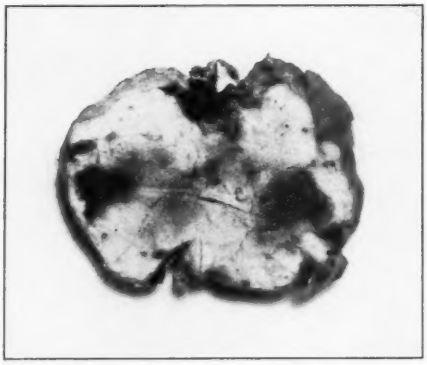

Fig. 8
(29102) Bisection of mass showing area of necrosis and blood clot.

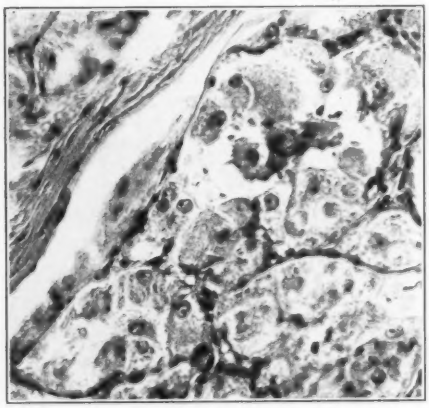

Fig. 9
(29102) Microscopic. Very cellular tumor, alveolar arrangement, and cells in pavement-like structure; endothelial cells in character.

and there stained areas of blood. It looked like cellular sarcoma, was quite friable, and had little connective tissue.

The section showed a very cellular tumor, large alveoli cells separated by fibrous stroma, cells of the endothelial type.

The diagnosis was sarcoma of the endothelial type (*Figs. 4, 5* and *6*).

Case 3 (No. 29102).—The patient, a white female, aged 17 years, entered the hospital complaining of pain and a lump in the left side. A mass could be felt on the posterior surface of the left chest, in the region of the eleventh and twelfth ribs. X-ray showed a mass extending into the pleural cavity.

Operation.—Under general anesthesia, the tumor with a portion of two ribs was removed. The pleural cavity was entered and there was postoperative empyema and postoperative hemorrhage. She was discharged from the hospital in fair shape and for two years there was a gradual improvement in her general condition, then a lump recurred in the region of the old operation, gradually increasing in size to that of a large olive. She entered the hospital a second time and at operation a number of nodules were felt in the region of the first operation, and several of these were removed. She was able to leave the hospital, but died in about two months.

Gross specimen showed a round, firm tumor about the size of a peach, attached to and involving a rib. The pleura was firmly adherent to the tumor. The free portion of the pleura showed a few nodules about the size of a millet seed. In the center of the mass there was an area of clotted blood.

The section showed a very cellular tumor with an alveolar arrangement, the cells were large and had a pavement-like structure. The sections from the recurrence resembled in every way the original sections shown. The diagnosis was endothelioma (*Figs. 7, 8* and *9*).

Case 4 (No. 29387).—The patient, a white male, aged 45 years, gave a history of injury a number of years previously followed by pain and the appearance of a tumor beneath the costal angle on the right side anteriorly. At operation the mass was removed and the

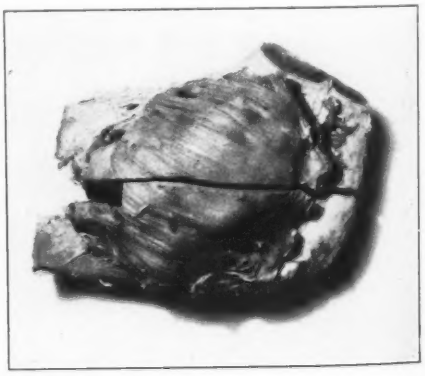

Fig. 10
(29387) Smooth walled tumor attached to the ribs, involving the pleura.

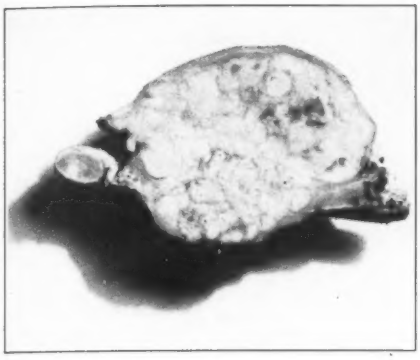

Fig. 11
(29387) Tumor mass. Very friable and very cellular in character, with no areas of hemorrhage or necrosis.

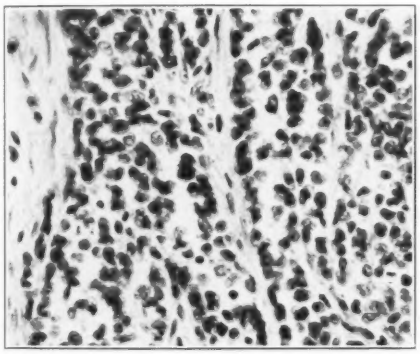

Fig. 12
(29387) Microscopic section. A very cellular tumor suggestive of angiomatous arrangement with cells more of the perithelial type.

pleural cavity was entered. The operation was very difficult and the patient was much shocked. He had a stormy recovery, left the hospital in several weeks' time, and died about a year later.

The gross specimen showed a smooth-walled tumor, attached to the ribs. The tumor was friable and cellular in character.

The section showed an inter-cellular hemangioma of the perithelial group (*Figs. 10, 11* and *12*).

I have described just four of our twenty-five recorded cases of endothelioma of the pleura. The other cases would be quite similar in history and examination, so I will not give them in detail. Suffice it to say that these cases range in age from 4 years to 66 years, and that the duration of symptoms has an equally long range, namely, from nine weeks to four years. The most startling fact, however, and the most important one, is that all twenty-five patients died either shortly after the operation or within a few years following the operation. It is somewhat unusual for a surgeon to report cases with a 100 per cent mortality, but I feel it most important to discuss these cases, for they were all given most careful x-ray and surgical treatment. I therefore present them to you with the hope that further study both in diagnosis and treatment may result in a better prognosis.

3301 North Charles Street

SARCOMA OF THE CHOROID*

By K. W. Cosgrove, M.D.†
Little Rock, Arkansas

Sarcoma of the choroid is divided, clinically, into four stages.

The first stage is characterized by a detachment of the retina with an accompanying scotoma. At this period of development, the differential diagnosis between a simple detachment and a tumor is somewhat difficult. Usually the detachment caused by the tumor exceeds greatly the actual size of the tumor. Where a definite tumor mass can be outlined by the ophthalmoscope or by transillumination, a definite diagnosis can be made and immediate enucleation is indicated.

In the second or glaucomatous stage, the diagnosis is easier. The detachment is usually complete and the intra-ocular tension is increased. However, the picture may be obscured by a secondary cataract. If the development has extended to this extent, the eye may simulate one with glaucoma absolutum. No differential diagnosis is necessary as enucleation is indicated in either case.

The third stage is characterized by extension through the sclera into the orbital tissues. This extension usually takes place where the ciliary vessels or nerves pierce this tough fibrous layer. It has been generally accepted that metastasis would rapidly follow this stage with death resulting within a year's time. The case to be reported in this paper was in this stage when first seen.

The fourth stage of multiple metastatic sarco-

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Fig. 1
Front and side view of case of melanosarcoma of choroid.

matosis in liver, lung and other organs is always fatal.

Sarcoma is classified pathologically in three ways: first, as to the presence or absence of pigment (melanin). The melanosarcoma outnumbers the leuko-sarcoma 8 to 1 (DeSchweinitz).[1]

The type of tumor cell present provides the second method of classification. These cells are of four types: the epithelioid (sometimes spoken of as the round cell) is composed of polygonal cells of variable size and shape. The fascicular type is based on the columnar arrangement of the cells rather than on nuclear morphology. The spindle cell type consists of fusiform cells with long, oval nuclei. This is subdivided into (a) those in which the nucleus has a delicate reticular structure and a poorly defined nucleolus, and (b) those with a coarse nuclear network and a prominent nucleolus. The fourth type is a combination of two or more of the above types, and is spoken of as the mixed cell type. Callender's[2] series of 273 cases of sarcoma of the choroid shows the following mortality percentage due to the new growth: mixed cell type, 29 per cent; fascicular, 25 per cent; epithelioid, 20 per cent; spindle cell type, A and B, 2 per cent. Moulton[3] reports 5 cases of sarcoma of the choroid. Four of these were of the spindle cell type, 3 of which showed no metastasis 11 to 28 years after enucleation. One developed fatal metastasis 4½ years after operation. The other of the epithelioid type developed metastasis 19 years after enucleation. In all of these cases, the eye was enucleated during the first or second stage of development.

The third method of classification, pathologically, depends upon the presence, distribution or absence of silver staining fibers amongst the tumor cells. Wilder and Callender[4] have divided this classification into three groups: (1) those showing no argyrophil fibers except in the interlobular stroma; (2) those having some areas with and some areas without these fibers; and (3) those showing argyrophil fibers amongst all tumor cell areas. In 46 cases followed more than five years, they show 100 per cent fatalities in the first group, 68 per cent in the second group, and no death in the third. From this preliminary report they concluded we should feel safe in presuming that a decrease in argyrophil fibers predicts an increased malignancy of the tumor.

REPORT OF CASE

A white man of 50 was admitted to the Baptist State Hospital December 28, 1931.

His chief complaint was tumor of the right eyeball.

His family history was irrelevant.

Seventeen years before there was an indefinite history of injury and sore right eye, during which he states "the

Fig. 2
X-ray showing markedly enlarged orbit without bone destruction.

sight ran out." The eye cleared up in six months, with no useful vision. The patient had no further trouble until two years previously. The eyeball contracted, but was not painful. He has had mild asthmatic attacks for twenty years.

Two years before my examination the patient struck his right eye against a bush and it became reddened. Shortly after that, there was noted a small lump just below the old eyeball which slowly increased in size until five months prviously, when the mass became suddenly larger, pushing out the lids. Very little pain was present except when he had a cold or when exposed to cold.

From the right orbit a mass protruded, about the size of a small orange. The lids were stretched and covered part of the mass. The orbital margin was markedly increased in all directions. The mass was covered with conjunctiva. Some purulent discharge was seen under the upper lid. No eyeball could be found. The mass was soft and appeared to fluctuate. Sensation over the areas supplied by the supra and infra-orbital nerves was decreased. No enlargement of the pre-auricular or cervical lymph nodes was noted.

The heart was normal, blood pressure 134/86, chest, few mucous rales, no abnormal dullness. The abdomen was normal. No nodules were palpable on the liver. The reflexes were normal.

Urinalysis was negative; Wassermann and Kahn were negative. White blood count was 8,400; hemoglobin, 70 per cent.

X-ray of the face shows marked enlargement of orbital margin. There is no sign of bone destruction nor are there any signs of invasion of the adjacent sinuses or the nasal fossae. X-ray of the chest shows only a few healed scars of old tuberculosis.

Operation.—The conjunctiva was incised and the mass found non-adherent. It easily dissected from the periosteum with finger and blunt elevator. The optic nerve and muscles were cut as close as possible to the optic foramen and the mass removed. The tumor had filled the entire orbit. The bony walls were intact. The orbit was packed with gauze. The patient made an uneventful postoperative recovery. He was discharged from the hospital on the tenth day, January 7, 1932.

This patient has been heard from every six months since his discharge from the hospital. He has been ex-

Fig. 3
Gross specimen.

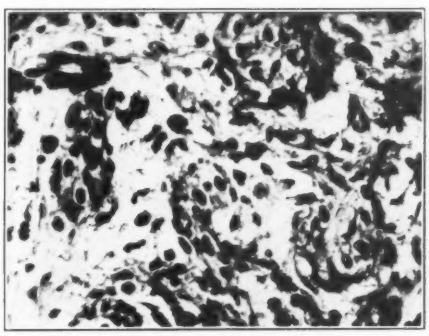

Fig. 4
High power hematoxylin and eosin. Section showing predominantly spindle cell structure.

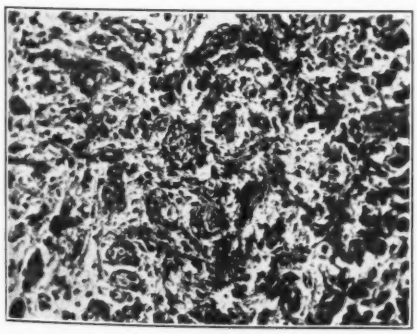

Fig. 4
Low power hematoxylin and eosin. Section showing predominantly spindle cell structure.

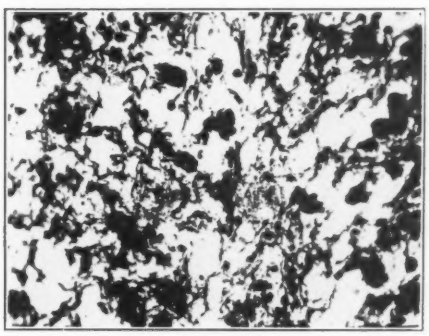

Fig. 5
High power, showing argyrophil fibers (Wilder's stain).

amined by his local physicians and no local recurrences or metastasis have been found. No attempt was made to do any plastic repair of socket, and his last letter to me said: "You can stick your fist in the hole."

Pathological Report.—The tumor mass is 7 by 3.5 cm., soft, and contains many areas of necrosis and hemorrhage. Microscopically, the spindle-shaped cells are distributed in islands through fibrous tissue. The cells vary in size and shape, some being polyhedral. Melanin is distributed in coarse granules. Much of the pigment is intracellular. One small blood vessel was noted containing melanin in spindle cells. The diagnosis was spindle cell sarcoma, sub-type B. Wilder's stain[5] used by Dr. Reaves (from Department of Pathology, University of Arkansas School of Medicine) shows a profusion of argyrophil fibers throughout all tumor areas examined.

In conclusion, it should be definitely apparent from this case and a study of recent literature that the prognosis in sarcoma of the choroid should be judged more by the type of cells and the distribution of argyrophil fibers rather than by the stage of development of the tumor.

I wish to thank the National Institute of Health, Dr. H. S. Thatcher and Dr. A. F. DeGroat for their gracious assistance in the pathology of this case.

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DISCUSSION (*Abstract*)

Dr. T. W. Moore, Huntington, W. Va.—On December 17, 1907, W. J. T., aged 67, came to me with a small detachment of the retina in the inferior nasal quadrant which in my notes I said was possibly a tumor. The patient had noticed that there was something wrong with the eye one month before. He went to a very able ophthalmologist in Cincinnati, who enucleated the eye and reported that the laboratory said the tumor was a melanotic sarcoma. This patient died in 1924 of pneumonia, having had no recurrence or, as far as we were able to determine, no metastasis.

J. W. L., aged 66, had his eye enucleated in September, 1930, for a tumor within the eyeball. The eyeball was sent to the Army Medical Bureau at Washington and pronounced melanotic sarcoma of a very malignant type. Every year since the Bureau has written to me for a check-up and so far there has been no recurrence or demonstrable metastasis.

These cases help to prove, as the author has said, that where there is an early removal, we may not have a return.

In the first case, irradiation was not suggested. In the second case, it was suggested, but for some reason not known to me, the patient never underwent this treatment.

ONE STAGE ABDOMINOPERINEAL RESECTION FOR CARCINOMA OF THE RECTUM*

By SAMUEL MCLANAHAN, M.D., F.A.C.S.
Baltimore, Maryland

There are two striking reasons why we should have a particular interest in carcinoma of the rectum. In the first place, the disease is far from being rare, for statistics indicate that, next to the stomach, the rectum is the most common site for cancer in the gastro-intestinal tract. This means that the alert diagnostician will be able to discover the undiagnosed case on many occasions. In the second place, rectal cancer is curable, and curable in a high percentage of cases, provided its diagnosis be not too long delayed.

When a surgeon undertakes to remove an operable malignant growth of the rectum or rectosigmoid, there are a variety of procedures at his disposal. In some instances he may be able to remove it entirely from the abdominal approach, in others he may choose to use only the perineal approach, whereas more often he will probably employ a combined operation. Furthermore, he may carry the operation out in one stage or in two or more stages, as he sees fit.

To be more specific, we may describe very briefly several of the methods which are in common use in our own country today. The simplest is the perineal excision of a low growth, with the preservation of a perineal anus. Another is the graded maneuver of Mummery which allows a more extensive removal of the rectal growth, for no attempt is made to preserve a perineal anus. The first stage of the Mummery operation is a preliminary colostomy. This colostomy of course remains. The objection raised to these operations is that they are not radical enough and do not remove the lymphatic nodes of the sigmoid mesentery. However, they can be carried out in patients who are grave operative risks and in whom more radical operations are not to be considered.

The other operations are largely modifications of the procedure described many years ago by Mr. W. Ernest Miles of England. Miles, for reasons which will in a moment be mentioned, ad-

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*Read in General Clinical Session, Southern Medical Association, Thirtieth Annual Meeting, Baltimore, Maryland, November 17-20, 1936.

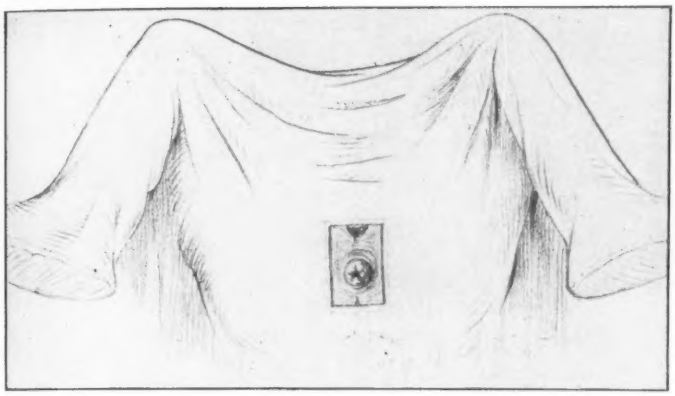

Fig. 1
The perineal part of the operation showing patient in the lithotomy position.

vocated wide removal of the pelvic mesocolon and the tissues adjacent to it, dissecting them cleanly from the hollow of the sacrum and removing a generous portion of perianal skin, perirectal fat and muscle. This was carried out by first making a low abdominal incision and forming a single barreled colostomy. When the abdominal dissection was completed, when the free intestine had been placed deep in the pelvis, and when the peritoneal diaphragm had been closed, then the patient was turned to a semiprone position and the perineal portion of the operation completed, with the final removal of the growth-bearing gut and its adjacent tissues. Rankin[1] and Lahey[2] have each devised well-known procedures which in reality make graded or two-stage operations of the Miles maneuver.

It has proven particularly interesting to go back to the original work of Miles in this connection and to note his painstaking investigations with regard to the lymphatics of the rectum, his keen observations on the mode of spread of these carcinomata, his thorough study of end-results, and above all, his clear-cut deductions. His work is today more appreciated than ever before, for upon it is founded the rationale of modern rectal resection.

Thirty years ago, in 1906, Mr. Miles started doing his abdominoperineal resections and two years later, in 1908, reported 12 one-stage operations, with 5 deaths.[3] In studying the results of the incomplete perineal operations done before that time, he found that recurrences came along the parietal attachments of the pelvic mesocolon, binding down the colon. In addition, lymph nodes at the bifurcation of the common iliac artery were involved. In referring to other abdominoperineal operations described by various surgeons, he wrote:

"The technic of these operators seems to have failed in one important respect, namely, the complete eradication of the *zone of upward spread* of cancer from the rectum, whereby the chance of recurrence of the disease, above the field of operation, can be diminished if not entirely obviated."

The principle of the Miles technic has been

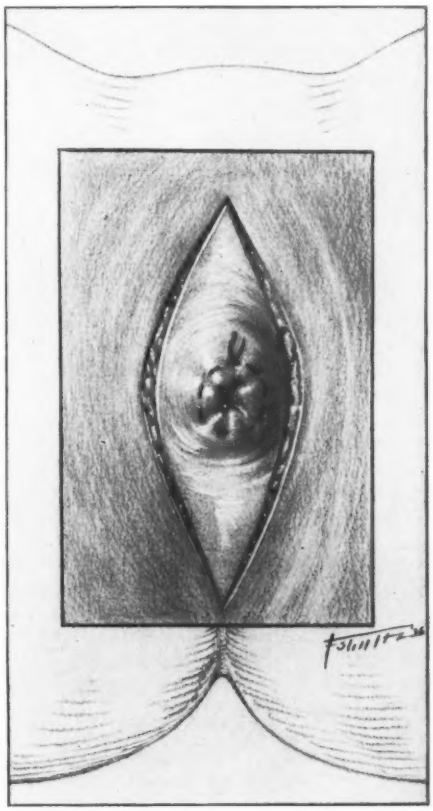

Fig. 2
The perineal incision, made after a purse-string suture has been placed about the anus.

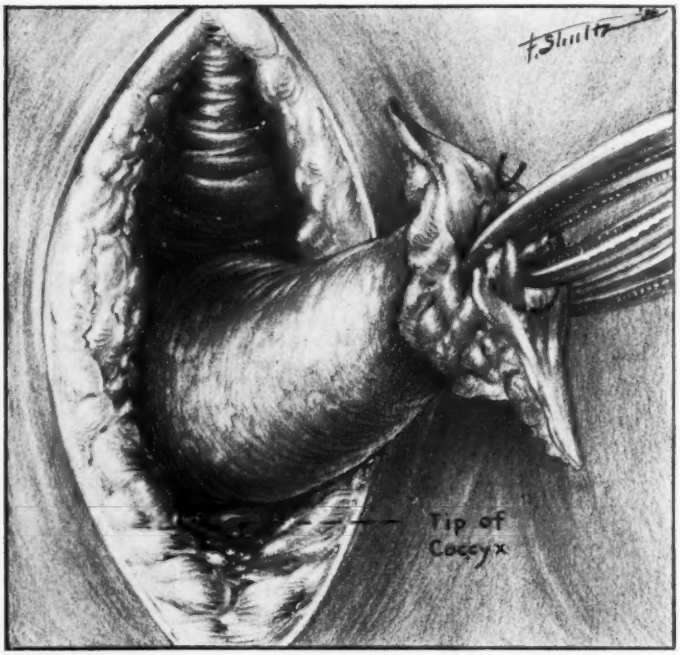

Fig. 3
Dissection of the perineal portion of the rectum. The presence and position of the coccyx may be noted.

followed by most of those in our own country who speak with authority on the surgery of rectal cancer, but the practice has very often been to carry out the operation in two stages. While having a living patient must always be a cardinal consideration in any surgical decision, and while that consideration must not be compromised, still there are many advantages of a one-stage over a two-stage operation. And if the procedure can be safely carried out in one stage it is highly desirable. Recently there has been noted an expression of opinion from many writers who find that it is possible and desirable to carry out more and more of these operations in one stage, thereby reducing materially for the patient, the discomfort, the loss of time and expense. Speaking of the Miles procedure, T. E. Jones[4] of Cleveland has written:

"Therefore we have particularly favored the one-stage combined abdominoperineal operation as that which gives the most hope for eventual cure."

Fred W. Rankin[5] has recently written:

". . . I must confess that within the past two years my own experience with the one-stage operation has led me to substitute it in an increasing number of cases, to the virtual abandonment of other types except under the circumstances mentioned above."

And then after defining the indications for a two-stage operation, he says:

"Given a movable growth in the rectum or at the recto-sigmoid in an individual without coexisting complications and an average operable risk from a general standpoint, the operative choice is the one-stage combined abdominoperineal resection."

Coller and Ransom,[6] of Ann Arbor, have concluded that

"The most important point in the operative treatment of carcinoma of the rectum is the recognition of the importance of the radical method of abdominoperineal resection as advocated by Miles. Whether this is accomplished in one or in several stages is a matter of personal preference of the surgeon and of distinctly less importance. Most patients can be operated upon as safely by the one-stage as with the multiple stage operations if proper preparation of the patient is effected."

Turning now to our own cases, it is significant to note that Dr. Harvey B. Stone, to whom I am deeply indebted for the privilege of reporting this series of his patients, has for many years practiced the performance of the one-stage operation safely, and only occasionally has found it necessary to employ a graded procedure.

Since 1923, there have been in this series 29 one-state abdominoperineal operations performed in four Baltimore hospitals. The patients have ranged in age from 23 to 76 years; 45 per cent have been males while 55 per cent have been females. Three of these 29 patients died during their hospital admission, giving an operative mortality of 10.3 per cent. Of these three, which must be classed as operative deaths, one succumbed to postoperative pneumonia, one to what appeared to be a sudden cardiac collapse and the third, aged 76, to paralytic ileus.

It has not been possible to trace three of these 29 patients, but of the remaining 26 we have recent knowledge. Of these 26, 17, or

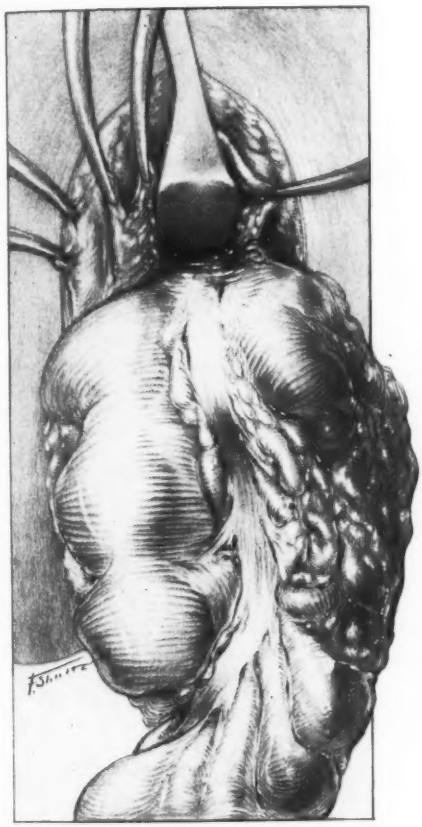

Fig. 4
Final removal of entire rectum and portion of sigmoid with attached mesentery. The major part of the dissection has been carried out during the abdominal approach.

65.3 per cent, are alive at the present time. Nine are known to be dead. Of these 9, 3 were operative deaths as mentioned above; 3 others are known to have died of cancer; 2 to have died of other causes and one whose cause of death was not ascertained. Of the 11 patients who were operated upon more than five years ago, 10 lived for five years or longer, giving for this small group 90 per cent of five-year cures. However, more deaths have chanced to occur in the later cases, and of those operated upon less than five years, 66 per cent are living.

Although recurrences are known to be present in several of these patients and although three have died of cancer, it has been felt that the operation has been abundantly worth while from the point of view of relieving obstruction and prolonging life. Certainly the operative mortality of 10 per cent is a reasonable one, and corresponds with that reported by certain other operators.

There are several matters with regard to the care of these patients, preoperative, operative and postoperative, which should be emphasized.

Only rarely is a patient with a rectal cancer so obstructed that operative decompression is required. Consequently conservative methods, now generally used, suffice to prepare the patient and his bowel for operation. A high caloric, residue-free diet, saline cathartics, cleansing enemata and rest, have been the fundamentals of the preoperative treatment. The bowel must be clean and this has taken usually seven and rarely more than ten days. No attempt at peritoneal

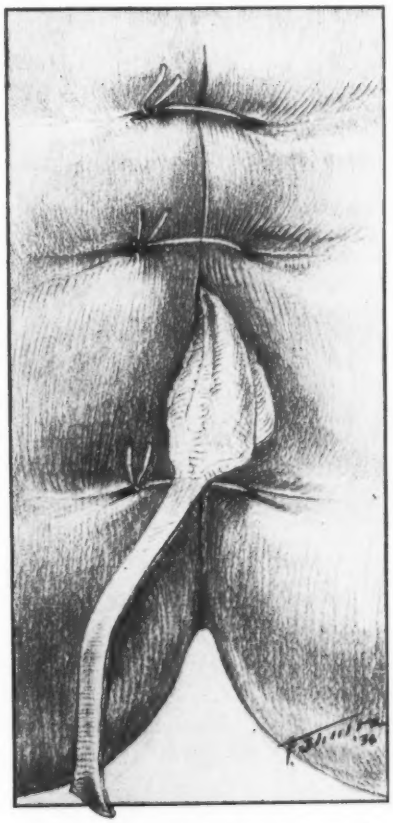

Fig. 5
A gauze roll has been gently packed in the wound and the edges closed loosely about it.

vaccination has been carried out in any of these cases.

The anesthesia has usually been gas-oxygen and ether. While spinal anesthesia has been used occasionally, inhalation anesthesia has been preferred.

There is not time to review in detail the operative technic. However, there are several important points to stress. The colostomy has been placed routinely in a left inguinal incision. Care has been exercised to secure a strong peritoneal diaphragm across the pelvis at the conclusion of the abdominal stage. In carrying out the perineal part, Dr. Stone has not had the patient turned into the prone position as is the practice with most operators, but has merely drawn him down a few inches on the table and suspended his legs in stirrups, the so-called dorsal lithotomy position. This has obviated the loss of time and the possible fall in blood pressure involved in radically changing the patient's position upon the table. Ample exposure has nearly always been possible without removing the coccyx, so that in only a few instances in this series has it been excised.

Transfusions have been used routinely and their importance cannot be over-emphasized. Usually given in the operating room toward the conclusion of the operation, they seem many times to have warded off an otherwise impending state of shock. When indicated, a preliminary transfusion should be given as a part of the preoperative preparation. This should not, however, supplant the operative transfusion which I feel should be given if it is at all possible to obtain a donor.

The postoperative care of these patients follows general surgical principles. The perineal wound must be irrigated and allowed to granulate. The time of opening the colostomy must depend upon the condition of the patient. Aluminum paste[7] on the skin has proven a great boon in preventing irritation from fecal drainage in the early weeks. The after-care of the colostomy is a chapter in itself. Suffice it to say, however, that one of the most encouraging features of the whole matter is the comparative ease and comfort with which these patients, when properly instructed, maintain their colostomies for the ensuing years.

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COMMON ERRORS IN THE DIAGNOSIS AND TREATMENT OF CANCER OF THE COLON AND RECTUM*

By FRED W. RANKIN, M.D.
Lexington, Kentucky

Diagnostic errors in the recognition of organic lesions of the large bowel and rectum are both of omission and commission. Failure to make a proper examination for these lesions results in more failures of diagnosis, or at least of failure to recognize them until their late stages, than any other single factor. Just why there should be a hesitation on the part of the physician to consider digital examination of the rectum as essential a part of a physical examination as the examination of the eyes, ears, nose and throat, or other cavities of the body, is unexplainable. There is some reason for failure to recognize organic lesions of the large bowel, particularly malignant disease in its earlier stages, for one must confess that it takes many decades of continual repetition to impress the laity, and not a few repeated attempts to impress the profession with both the significant symptoms of ordinary organic lesions, and the importance of haste and thoroughness in dealing with malignancies.

With recent years has come a very marked progress in the roentgenologic examinations of the gastro-intestinal tract. Twenty-five years ago x-ray diagnosis of gastric lesions was in its infancy. Today x-ray diagnosis of colonic lesions is in its adolescence, but progress has been made and is being made in this direction, and with the increasing facilities for the training of roentgenologists we may look to the future with optimism in so far as accuracy in location and recognition of pathological types of lesions of the colon are concerned.

Less excuse exists for the vast number of cases of rectal cancer which are yearly being operated

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upon for hemorrhoids, 20 per cent or more, without a digital or adequate proctoscopic examination. The average duration of cases of rectal and colonic cancer before diagnosis is made is ten to eleven months, and yet during this interval the patient has known of some symptoms which should have called attention to the lower gastro-intestinal tract. What are the earlier symptoms of cancer of the colon and rectum? Unfortunately, one may not set down in order a number of early pathognomonic signs or symptoms such as it is possible to enumerate in certain other locations, but it is probable that the most characteristic early symptom which presents in the majority of cases, is bowel irritability as expressed by change in bowel habit. Multiple stools, or periods of constipation, or alternating periods of diarrhea and constipation probably represent the earliest evidences of a cancer of the lower gastro-intestinal tract.

Blood makes its appearance in a large number of cases, but necessarily not until the lesion which begins under the mucous coat of the bowel has advanced to a point of ulceration and invaded the blood vessels. Pain is present usually only in the later stages of the disease when nerve elements have been encroached upon, and is an unfortunately late and unreliable symptom. How many lives could be saved if pain were an early symptom of cancer anywhere which forced patients to seek advice before the process had invaded regional lymphatics!

The obvious corollary to these elements of delay is that if an individual has change of bowel habit which persists over a period of two weeks to a month, a thorough and complete general examination which includes a roentgenologic survey of the colon and a proctoscopic examination, should be made. These steps would reduce the delay in finding colonic and rectal cancers by many months and, by the same token, would enhance the prognosis no little.

A competent radiologist, given sympathetic cooperation by the patient, is capable of accurate diagnosis in at least 95 per cent of the cases of organic lesions of the colon, and here again I would urge the necessity of allowing the radiologist some latitude in making his examinations. If the symptoms are indefinite; if there is some question that there is a coexisting lesion of the upper gastro-intestinal tract, or that the only lesion may be in the upper gastro-intestinal tract, invariably where suspicion of a colonic lesion occurs, the colon should be investigated first, and this examination should be made by the use of the barium enema. Not once, but often, I have been called upon to decompress an acute intestinal obstruction produced by the introduction of the opaque medium by mouth for examination of the lower gastro-intestinal tract. The concrete mixture, meeting a stenosis in the lower bowel, is suddenly and completely stopped and an acute condition, lethal unless immediately relieved, is superimposed upon a grave malignancy. Furthermore, radiologists are agreed that for the diagnosis of organic lesions of the colon itself, administration of the opaque medium by mouth is far from being as satisfactory as when it is introduced per rectum.

Should we not then cooperate with the radiologist to the extent of permitting him to use his judgment not only in the examination, but in the preparation of patients suspected of harboring a colonic malignancy? I feel sure that the common tendency to send a patient to an x-ray man with a note asking for a gastro-intestinal series is an unnecessary handicap.

True, all cancers of the colon do not present classical symptoms and consequently delay and its concomitant sequelae often are responsible for seeing the individual first in the late stages. Likewise, some of the more unusual lesions such as tuberculosis, amebiasis, or endometriosis make the diagnosis more difficult, as is evidenced by some of the appended cases:

Case 1.—H. H. H., a man, aged 53 years, was referred to me November 2, 1933, with a diagnosis of cancer of the colon.

The family history was unimportant.

He had had childhood diseases without complications. Four months previously this man began to have difficulty with his bowels characterized by pain, rectal bleeding, and symptoms of flatulence and general abdominal distress. The blood in the stools was both fresh and dark. He had been treated by a physician for an anal fistula. An x-ray of the colon was made and diagnosis of cancer of the right colon reported. Blood examination was normal, as was an x-ray of the chest and proctoscopic examination of the lower bowel up to 21 cm. No stool examination was made. The patient had visited the World Fair in Chicago during the month preceding the beginning of symptoms.

Our roentgenologist concurred in the opinion that there was a large filling defect in the hepatic flexure of the colon. On exploration through a left rectus incision, the liver was felt first and no evidences of nodules were made out. There was a lesion in the cecum and another in the transverse colon close to the splenic flexure. Both of these lesions were surrounded by many inflammatory adhesions, there was quite a bit of injection in the mesentery and the adjacent tissues, and the note was made that the lesions did not appear to be malignant. I did an aseptic end-to-side ileocolostomy over

my clamp between the descending colon and the terminal ileum.

The patient had a stormy convalescence from the first and died on the seventh day following operation. The autopsy report was as follows: Death from peritonitis; diagnosis, acute amebic ulcerative colitis; early fatty degeneration of the liver; cloudy swelling of parenchymatous tissues.

This was the first case of acute amebiasis which the roentgenologist who examined this man had ever seen. Since the diagnosis was positive and the symptom complex fitted the picture satisfactorily, I unhesitatingly agreed and explored the patient, believing him to have a cancer of the colon. At exploration I recognized the lesions as probably inflammatory and certainly atypical if malignant. The subsequent course, namely, peritonitis and death, followed, and the autopsy findings confirmed the amebiasis. Not a few such cases were reported during the latter part of the year 1934, following the Chicago epidemic, and the operative results in all these cases were practically identical.

Case 2.—L. W., a woman, aged 23 years, had an unimportant family history.

The menses were regular, 28-day type, flow four to six days, second and third days always profuse. She had always had cramps the day before and during the first day of the period. She had been married four years, was never pregnant, and had never used contraceptives.

On September 30, 1935, the patient was explored elsewhere for "female trouble" which was supposed to originate in the right tube and ovary. The appendix was removed and an unsuspected growth found in the pelvis. The appearance of the growth led to the diagnosis of a cancer of the sigmoid, and the abdomen was closed without removing it or a specimen of it. Deep x-ray therapy was instituted and was followed by a general reaction. These treatments were continued for a matter of six weeks, when the patient consulted me.

On examination I could feel a tumor in the right pelvis and because of her youth and excellent condition, (weight 115 pounds, blood pressure 116/80, blood count, erythrocytes, 3,670,000, hemoglobin 66.7 per cent, and leukocytes 4,700, urinalysis negative) decided to explore her.

On December 19, 1935, I explored the abdomen through a low midline incision and found a tumor at the rectosigmoid juncture involving the posterior vaginal wall. It obviously was not a malignant tumor and I removed the recto-vaginal septum and anterior part of the bowel at the rectosigmoid juncture, closed the vagina and rectum separately in layers. I did not remove the tubes and ovaries because the patient had had x-ray treatments, making it difficult to tell, after the diagnosis of endometriosis, which ovary was involved.

Endometriosis was diagnosed.

The patient made an uninterrupted convalescence and is well at present except for symptoms of the artificial menopause which was produced by x-ray.

This woman was explored because of her age and good general condition; also, because a specimen had not been taken at the previous operation. I could feel a tumor in the pelvis on vaginal examination, and suspecting that it might not be an inoperable malignancy, if it was a cancer, undertook the operation.

The diagnosis of endometriosis was made only after removal of the tumor, since the appearance of a lesion low in the sigmoid from endometrial implantations is not unlike that of the usual cancer in this location. One should suspect such a diagnosis in a well-nourished young woman with a history of amenorrhea, dysmenorrhea, and sterility and with a lesion low in the gastro-intestinal tract but still in the peritoneal cavity, which, as shown by proctoscopic examination, has not produced an ulceration in the mucous membrane.

Case 3.—Mrs. Y. M., aged 41 years, had an unimportant family history.

She had been married 23 years and had had six children. She had a normal menstrual history. She had been operated upon fifteen years before for ectopic pregnancy. There had been no serious illnesses.

The chief complaint was diarrhea of one year's duration. With previous good health and regular bowel habit, one year ago the patient developed a diarrhea with stools ranging from six to ten daily. At first the stools were soft, later liquid, and subsequently they contained bright blood and mucus. These attacks cleared up, but crampy pains at intervals, especially over the lower abdomen, persisted throughout the entire year. She had numerous examinations for ameba, with negative findings. She lost 25 pounds in six months. There was no dyspepsia, no jaundice, no nausea or vomiting until one week before my examination, when she was explored by her local surgeon after a diagnosis of adhesions. At that time a cancer of the sigmoid at the juncture of the lower and middle thirds was discovered.

When I first saw the patient, two weeks after this laparotomy, she was obviously subacutely obstructed, and I did a blind cecostomy through a McBurney incision under local anesthesia. Six weeks later she returned for resection of the growth, an adenocarcinoma of the sigmoid.

This history points directly to an organic lesion in the large bowel and such a lesion should have been suspected because of the examinations for ameba. The failure to make an x-ray of the colon before undertaking an exploration, unbelievable as it is, frequently happens.

With cancer of the rectum, bleeding is the important symptom which sends these individuals for examination, and while it is trite to repeat that bleeding more often comes from benign than from malignant lesions of the rectum, it is nevertheless true, and it is equally true that any persistent evidence of bright blood in the alvine discharges should be considered as of malignant origin until definitely proved to result from piles, fissures, adenomas, or some innocuous source. The digital examination of the rectum with the

patient in the knee-chest position and straining against the examining finger, will in the large majority of instances allow the examiner to feel any existing rectal cancer.

On the other hand, there are a few cancers at the rectosigmoid juncture which are so immovable or so high up as to fail to come down to the touch, and consequently they cannot be felt. However, every cancer of the rectum can be diagnosed by proctoscopic examination. This examination is not difficult: the rectum needs only to be clean, the patient in the knee-chest position, and every physician may introduce a proctoscope as far as the rectosigmoid juncture, even though he has no special training.

The appearance of a single ulcer with overhanging, bleeding, granulating edges and a sluggish base, or a polypoid adenomatous mass which may or may not be pedunculated but crowds itself into the lumen of the bowel, leaves small question as to the type of lesion with which one is dealing. If there is any doubt as to malignancy or benignancy, one may make a biopsy for microscopic study. This routine step I have employed for the last ten years and, so far as I know, there is no evidence to establish the criticism that some rectal cancers are thereby disseminated.

If the biopsy is made with a sharp instrument and the spot from which it is taken immediately touched with a cautery, I have no fear that it will be followed by spread of cancer cells. The use of biopsy has been more to determine the grading of the growth than to establish its malignancy for accurate knowledge of grading gives one a very accurate yardstick by which to measure prognosis.

The following two cases fall into different categories, the first as an evidence of failure to make a proper prostoscopic examination, although vigorous and numerous other examinations were made, among which was an exploration of the spermatic cord; while the other case represents a patient whose growth was low grade without glandular involvement when removed and which had been subjected to a local fulguration four months previously without destruction of the growth or amelioration of the symptoms.

Case 4.—Dr. A. W. S., a physician, aged 59 years, had an unimportant family history.

He had had no serious illnesses. His tonsils were removed 25 years before; biopsy of the left spermatic cord was done two weeks before I saw him.

For one year he had had nocturia once or twice, increasing in the last six months to four times a night. There was no diuria, no blood nor stones. The urine was negative on repeated examinations. Pelvic pain was indefinitely located in the bladder, then in the rectum. For the last three months he had had pain in the rectum and left testicle. Two weeks before, the left spermatic cord was explored and biopsy reported negative. He had been constipated for ten to twelve weeks. Ten weeks previously he took a laxative which caused violent cramps and since then had taken laxatives frequently which caused abdominal pain. There was no blood nor mucus in the stools.

X-ray examination of the colon showed a filling defect at the rectosigmoid juncture. Proctoscopic examination showed a cancer of the rectosigmoid. Blood count showed 5,200,000 erythrocytes; hemoglobin, 90 per cent; leukocytes, 11,600.

One-stage combined abdomino-perineal resection was done.

Adenocarcinoma of the rectosigmoid, Grade III, without metastases to the lymphatics, was diagnosed on pathologic examination.

Case 5.—R. R., a man, aged 31 years, gave an unimportant family history.

In April, 1936, he became markedly constipated, whereas previously he had had one to two normal stools a day. He took laxatives with increasing frequency. In May, the stools increased to ten or twelve a day and occasionally at night, and blood and mucus appeared constantly. In July, a specimen was removed from a rectal growth and reported mucoid adenocarcinoma. Fulguration was done with little or no improvement. Bloody discharges and constipation and pain in the lower back, severe at times, appeared, and in addition the patient began to fail in strength and to lose weight.

On October 2, 1936, I found a firm mass 5 cm. inside the rectal sphincter almost completely encircling the rectum and attached firmly to the prostate gland.

On October 6, 1936, exploration showed no liver nodules, the growth to be movable enough to resect, and because of the patient's condition a loop colostomy was done. On October 26, a posterior resection after Mummery's technic was done.

The pathologic diagnosis was mucoid adenocarcinoma, Grade II, without glandular involvement.

Recently there has been a revival by electrodesiccation of the oldest methods known to man in the treatment of cancer, namely, its local destruction by means of the hot iron or some coagulating agent. I have no enthusiasm for nor experience with this method, feeling as I do that any malignant tumor, regardless of its location, which is surgical, should be treated by radical extirpation, not only of the offending growth, but the lymph nodes in its immediate vicinity. For further evidence of the futility of local attack, one need only to quote statistical data to show that 46 per cent of specimens of cancer of the rectum show glandular involvement.

Since electrodesiccation by the actual cautery or other local agents of this type provide no means for eradicating cancer already in the

lymph nodes, I feel distinctly that the indications for their application are quite restricted. This patient was a young man, it is true, and he had a mucoid carcinoma the ultimate prognosis of which is not good, but the prognosis for a number of years of life following its radical removal is better than in the ordinary adenocarcinoma of a similar grade.

Case 6.—W. C., a man, 34 years old, complained of hemorrhoids. His family history was unimportant. He had had the usual childhood diseases, but no serious illnesses. He had a hemorrhoidectomy in 1921. For the previous two months he has had protrusion of recurrent hemorrhoids. He has been to the family doctor for treatment and without examination was advised to have a hemorrhoidectomy. He was sent into the hospital and still without a digital or proctoscopic examination was placed on the operating table and anesthetized. In straining under the anesthetic a low cancer of the ampulla of the rectum projected itself into the field. The anesthetic was discontinued and the patient referred to me.

Proctoscopy revealed a large cancer of the rectum encircling one-half of the circumference of the bowel, but not producing obstruction. Beyond the cancer the bowel was negative for 22 cm. An x-ray of the chest was negative. The patient's general condition was good. His blood count showed 4,340,000 erythrocytes, hemoglobin 86.6 per cent, and leukocytes 5,760. Urinalysis was negative. Blood pressure was 120/80.

Operation consisted of combined abdomino-perineal resection of the rectum.

Pathologic diagnosis was papilliferous adenocarcinoma of the rectum with local metastases to the lymph nodes.

Just how many cancers of the rectum are operated upon for hemorrhoids it is difficult to ascertain, the statistical data from different clinics varying widely. In a recent communication from one of my colleagues, I am told that in his clinic 50 per cent of cases of cancer of the rectum as he has seen them have been treated for piles. In my own experience it is not as high as this, probably not higher than 25 per cent.

It is quite obvious that the old-time method of treating a patient for piles without even an informal inspection of the rectum, or the more troublesome digital examination has not been abandoned completely.

To epitomize: one must recognize that the earlier symptoms of cancer of the colon are insidious and inclined to mimic many other intra-abdominal lesions. If the colon proper be divided into its two halves, the right arm of which is a physiologic organ and the left arm a storehouse, one finds the symptoms, pathology, and operative treatment to differ markedly.

Cancers of the right colon incline to fall generally into two large groups: a dyspeptic group mimicking gallbladder disease, chronic appendicitis, or duodenal ulcer; and an anemic group often confused symptomatically with primary anemia, but readily recognized as due to a loss of blood which is not visible in the stool, but which may be noted by tests for occult blood. To these one adds an occasional tumor accidentally discovered during the course of a routine physical examination which has not produced symptoms.

Beyond the middle of the transverse colon one finds that obstructive phenomena dominate the picture and in the rectum, blood and low pelvic pain are the most important symptoms. From cecum to anal canal irregularities of bowel habit should call our attention to organic lesions of this portion of the gastro-intestinal tract, and a patient in the middle decades of life complaining of alternating periods of diarrhea and constipation, or bright blood on the stool, or vague intestinal symptoms unaccounted for in the usual manner, but persistent over a period of two weeks to a month, should be given a complete examination which includes a sigmoidoscopic examination and a roentgenologic study of the large bowel.

One cannot emphasize too strongly that the symptoms so often graphically described in textbooks of loss of weight, of strength, anemia, palpable masses, *et cetera,* are but the evidences of impending death from metastases and are in no way symptoms of cancer of the colon or rectum.

Treatment.—With the well-recognized hopeful prognosis following radical extirpative surgical measures in operable cases and the increasingly satisfactory diagnostic and proctoscopic recognition of lesions of the lower gastro-intestinal tract becoming routine, it is obvious that proper selection of cases for operation and proper types of operation for individual cases have immensely benefited patients harboring cancers of the colon and rectum.

The fundamental principles underlying successful extirpation of cancer of the colon differ markedly in the two halves of the bowel and for a good reason. The structure of the bowel is thinner, its caliber larger, and its content liquid from cecum to middle of the transverse colon. Beyond that point the bowel is more muscular, smaller in caliber, and the column of dejecta is formed.

The blood supply of the large bowel is constant, its patterns are regular and there is a very small percentage of variation in human beings,

but the blood supply is scant as compared to the small bowel and arranged in arcs from which small single vessels diverge to penetrate the bowel wall. This relative scantiness of blood supply is one reason why a direct anastomosis of either the right or the left arm of the colon is more hazardous than delayed or graded operations. Infection may play some part, for it is impossible even partially to sterilize the content of the colon, but infection at the suture line is in my judgment much less of a hazard than infection in the peri-colonic tissues which harbor organisms because of the increased permeability of the bowel wall under circumstances of obstruction and ulceration. Consequently, in extirpating a cancer of the large bowel either in the right or the left side, I have rarely in recent years succumbed to the temptation to perform a single-stage complete maneuver, but have been content to utilize multiple stage procedures.

In the right colon I believe that an aseptic ileocolostomy between the terminal ileum and the middle of the transverse colon, which is easily accomplished over my clamp or by the use of the Parker-Kerr technic, is the most desirable first stage. The complete by-passing of the fecal current tends to reduce the infection at the site of the growth and consequently in the pericolonic tissues, and the subsequent mobilization of the bowel is less likely to be followed by peritoneal contamination.

At the second stage done at the optimum time after adequate rehabilitation, the right arm of the colon may be removed around to the anastomosis with a very low mortality. The use of exteriorization procedures in the right half of the colon is deprecated, first, because of the likelihood of contamination by the very maneuver of mobilization, and second, because at the removal of the growth the fecal current from the small bowel pouring out over the abdominal wall and wound is most disagreeable and difficult either to control or to tolerate.

Occasionally one may be justified in doing a single-stage maneuver in the right colon, but if this operation is indulged in, a complementary ileostomy should be established 20 to 30 cm. from the line of anastomosis.

In the left colon it has been my custom to employ the obstructive resection or cecostomy and obstructive resection, or cecostomy and subsequent anastomosis, lateral or end-to-end, or occasionally an exteriorization procedure. In my opinion primary anastomosis in the left colon unless it can be done by lateral anastomosis, is entirely too dangerous, from the standpoint of hospital mortality, to be undertaken routinely; and if one makes a lateral anastomosis he is often criticised for failing to remove an adequate amount of mesentery in doing the resection.

Within the past ten years I have found my attitude changing in selection of the type of operation for dealing with cancer of the rectum and rectosigmoid. Unquestionably, no single type of operation is adequate, but with the ideal radical one- or two-stage combined abdomino-perineal, and the colostomy and posterior resection of Mummery to choose from, most cases which are not immovably fixed in the pelvis or which are not inoperable because of hepatic metastases, may be fitted into one of these three procedures.

My opposition to operations which sacrifice the fundamental principles of gland dissection with a view to saving the sphincteric mechanism has been frequently expressed. I believe with Miles that the removal of the sigmoid mesentery is just as important a part of a radical operation for cancer of the rectum and rectosigmoid as is axillary dissection necessary in radical breast amputations.

The fundamental principles upon which all radical operations for removal of cancer anywhere are based, demand block dissection of the adjacent tissues and gland-bearing areas, and the pelvis is no exception to the rule. Two out of three cancers of the rectum are in reality cancers of the rectosigmoid juncture and cannot be removed radically by any of the less extensive procedures which fail to excise a large portion of the sigmoid flexure and its mesentery.

Mortality has gradually been reduced and operability gradually increased in dealing with rectal and rectosigmoidal cancer, and at the same time the more radical one-stage resection has been coming more and more into utilization in the hands of experienced surgeons.

At the meeting of the American Surgical Association in Chicago in May of this year, I reported the last 50 cases which I had operated upon up to March, 1936, 18 of which were done as one-stage combined abdomino-perineal resections after the Miles technic, 16 as posterior resections and colostomy after Mummery's technic, and four two-stage combined abdomino-peri-

neal resections, Rankin's technic. In these 50 cases there were 38 resections, giving an operability of 76 per cent. The mortality in the group was 5 patients, or 10 per cent, but four of the fatalities occurred following colostomy alone and only one followed resection and that was a posterior type of operation following colostomy. In the one-stage operations there were no deaths.

This mortality is the usual one and comes largely from the bad risk cases which succumb to the preliminary stage of the graded maneuver. The sturdy risks of course are subjected to the more radical one-stage operation, although in this particular series practically 50 per cent were done by Miles' technic.

With a high operability rate, 50 to 75 per cent, and with these mortality figures following resection, one is justified in being optimistic about the immediate outcome of rectal cancer cases. Furthermore, the prognosis from cancer is more satisfactory in this location following surgery than elsewhere in the gastro-intestinal tract, ranging as it does from 38 to 79 per cent for cancer of the rectum and rectosigmoid, depending upon the type of operation used, the grading of the growth, and other factors both intrinsic and extrinsic.

During the past three years I have had a distinct satisfaction from making some changes in the routine preparation and handling of cases of cancer of the rectum and rectosigmoid, which are as follows: first, abandonment of intraperitoneal vaccine as a preliminary preparatory step; second, the elimination of spinal anesthesia as a routine anesthetic; third, an extension of the period of preparation to at least seven days; fourth, the routine performance of presacral neurectomy (I have had much trouble with bladder complications in my series of resections, and hoping that this would assist in emptying the bladder and cut down the urinary complications, have employed it routinely, but am unable to say whether or not it is advantageous); fifth, routine postoperative blood transfusions; and sixth, a wider use of the single-stage abdomino-perineal resection after the technic of Miles.

While the crux of the cancer situation continues to be earlier diagnosis, optimism is warranted in dealing with cancer of the lower gastro-intestinal tract and so long as surgery continues to be the best therapeutic measure available, approach in as radical a fashion as is possible is urgently indicated.

ROENTGEN THERAPY IN CARCINOMA OF THE RECTUM*

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The choice between radiation therapy and surgery in the cure of cancer depends in many instances upon the histologic character of the tumor. Coutard has recently re-emphasized the fact that tumors composed of undifferentiated cells are radiological problems, while malignant tumors composed of highly differentiated cells are, for the present, best treated by surgical removal. The exception to this rule is to be found in cancers composed of highly differentiated cells which are frequently radiosensitive. The recognition and application of this observation would bring about a great improvement in the control of cancer regardless of its location, for there can be no doubt that radiosensitive growths are not amenable to cure by surgery and they constitute from 15 to 20 per cent of all cancers, and in some locations in the body the proportion of radiosensitive to radioresistant growths is very much higher.

The recognition of tumor radiosensitivity depends upon three factors named in order of their importance: (1) therapeutic radiation test; (2) location of the tumor with respect to type of structure from which it probably originates; (3) cytologic classification. It is, of course, comparatively easy to observe the changes in a tumor when it is subjected to radiation. The advisability of determining radiosensitivity by this method is another matter. Tumors arising from lymphoid structures in the pharynx, the lymph nodes and the generative apparatus are known to be radiosensitive as a rule. Cytologic classification is helpful because the origin of the cells is revealed and the presence or absence of mitotic figures is noted, as well as size, shape and staining properties of cell and nucleus; however, all of these findings are not accepted by some pathologists of repute. The practical application of the established facts demands nothing more than subjecting all suspiciously malignant tumors to a third of a sterilizing dose of roentgen rays as rapidly as possible and waiting three weeks to observe the effects. The highly sensitive tumors will shrink perceptibly and may com-

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*From the Radiological Clinic of Drs. Groover, Christie and Merritt.

pletely disappear. The resistant tumors will show little or no effects, but the sensitive cells, which are nearly always a part of every tumor, will succumb, and it is these cells which are chiefly responsible for metastasis.

We have advocated the radiation test for sensitivity for about ten years and we have accumulated data which seem to establish it conclusively as a measure to be considered in the majority of suspiciously malignant tumors. The only adverse argument is that delay in operating is dangerous; but on the other hand a highly radiosensitive tumor is nearly always, if not invariably, a bad surgical problem, and the determination of radiosensitivity by the radiation test disposes of some of the very elements which render cancers dangerous to life.

Carcinoma of the rectum is ordinarily not subjected to radiation therapy for other purposes than palliation, but in several of the cases reported herewith this form of therapy was employed for its possible curative effects. Prior to accepting these cases for treatment we had treated carcinoma of the sigmoid in 1924 in an elderly subject as a palliative measure. The hemorrhage and obstructive tendency in this instance were controlled for more than four years by eleven series of deep roentgen therapy administered over a three-year period. In another case, we were able by intensive therapy to control hemorrhage effectively and to reduce the size of a large carcinoma of the rectum, greatly facilitating its subsequent complete removal three years ago. The subject remains in good health.

We have also used radon interstitially and heavily filtered low concentration radium needles in a few selected cases, but without success, and we have abandoned this method of treatment entirely.

Early diagnosis is of the utmost importance, for a rectal carcinoma restricted to an area one or two centimeters on the rectal mucosa can be cured by radiation in most instances, whereas by the surgical treatment nothing short of a complete resection of the rectum and a permanent colostomy will suffice, regardless of the size of the lesion. In other words, the surgical cure of any rectal carcinoma usually necessitates a radical operation. Radiation failures, if and when they are encountered, may be corrected by a radical operation and this has been our experience in at least one instance.

As a matter of fact, we have never seen or treated an early rectal carcinoma, but the experience we have had in the advanced cases, together with the well-known curative effect of radiant energy in the treatment of comparatively radio-resistant cancers elsewhere, leads us to the conclusion that cancers of the rectum are primarily radiological problems.

Our treatment technic has varied with accumulated experience and changes in apparatus. We anticipate further improvements as we acquire information concerning the best method of irradiating malignant tumors composed of highly differentiated cells. At the present time it is our practice to irradiate cancer of the rectum with both the roentgen rays and radium. Generally, we aim to deliver a total dose of 12,000 roentgens, 3,000 R through each of four ports, 15x15 cm. or smaller, over a sixty-day period. We cross-fire on the rectum through two anterior ports and treat directly on the lesion through one sacral and one perineal port, employing 220 kv. peak, a distance of 50 cm., and a heavy Thoraeus filter equivalent to 5 mm. of copper. At the conclusion of this series of treatments a heavily filtered radium pack is inserted into the rectum and a total dose of 3,000 to 4,000 mg. hrs. administered at the rate of 400 to 600 mg. hrs. per day. The radium pack is constructed to fit the size and location of the growth and is backed with lead if the growth involves less than the entire lumen of the gut. However constructed, it is generally 2 cm. in diameter so that the radium container is maintained at a 1 cm. distance from the tumor. This method is applicable to fungating cancers of the rectum and is less valuable in the ulcerating or infiltrating types. Infection is a major deterrent to more successful radiation results. It is, of course, always present in carcinoma of the rectum and is not sufficiently obviated by a colostomy to warrant this operation as a routine measure. Naturally the infection varies with the extent, depth and duration of the ulcerative process, and with other factors common to all.

Infection, proctitis, diarrhea and tenesmus, which invariably follow intensive radiation therapy, are partially controlled by liberal doses of the tincture of deodorized opium. A liberal soft diet is prescribed as soon as the treatments are well under way. Roentgen sickness has not been encountered to any considerable extent in any of our cases.

We do not minimize the severity of the symptoms resulting from intensive radiation therapy of rectal carcinoma. There is a substantial loss of body weight and an intense local reaction which renders the patient most miserable. The

tone of the anal sphincter is impaired by the treatments and complete voluntary control temporarily lost. The period of greatest suffering begins about the fourth week and persists until two weeks after the radium treatments. Notwithstanding all this, few of our cases have been hospitalized even at the height of the reaction. We have maintained that the good effect of remaining ambulatory outweighs any of the advantages to be derived from complete hospitalization.

CARCINOMA OF THE RECTUM TREATED BY X-RAY

Cases living 14 Cases dead 23

(1)	Cases treated and receiving good palliation	16
(2)	Cases treated and receiving no benefit	10
(3)	Cases treated and apparently arrested	6
(4)	Cases treated and benefited prior to operation	2
(5)	Cases treated and benefited for postoperative recurrence (one possibly arrested)	2
(6)	Cases with no information	1

Colostomy was performed in 3.

Death was due to local extension, peritonitis, exhaustion or distant metastasis in 21; to coronary disease in one, and gangrene of the lung with pelvic abscess in another. In the latter case there was no trace of the original or other malignant tumor at autopsy, but the recto-vaginal abscess which was probably the precursor of pulmonary gangrene, developed as a result of too rapid and intensive treatments.

Observation of the arrested cases extends over a period varying from two to three and a half years. In this brief report we have pointed out the advantages to be derived from the radiotherapeutic test for malignancy as well as the therapeutic possibilities of radiation treatments in cancer of the rectum.

DISCUSSION (*Abstract*)

Dr. Grant E. Ward, Baltimore, Md.—My interest in cancer of the rectum began in 1923, when I was associated at the Howard A. Kelly Hospital. Dr. Kelly and I published a review of 250 cases of cancer of the rectum which had been treated in that institution over a period of ten years plus, that is, from December 10, 1911, to January 24, 1922. In the conclusion of the article, we made the following statement: "At present we can say that uniformly, whether by radium alone or in combination with operation and colostomy, a combination of external and internal application gives the highest percentage of palliation, while the radical operation, plus external treatment, yields the highest percentage of well patients, namely, 32 per cent. External treatment in cases where there was no operation, gave a cure of 11.1 per cent." (*Surgery, Gynecology and Obstetrics*, pp. 626-634, November, 1923).

In the years following, I have come to believe that the best treatment of cancer of the rectum is radical operation if the tumor is operable. This should be followed by thorough irradiation of the pelvis. Preoperative irradiation of the pelvis with x-ray might be of benefit in some cases, particularly where the growth is badly infected. The use of radium in the rectum preoperatively is usually objected to on the basis that it causes a good deal of vascularity and adhesions, making the operation more serious. The above quoted statistics are based on the total number of cases treated, including extensive, as well as early ones. Naturally, the best results were obtained where radium and operation were combined, because in these cases the patients came earlier and the growth was smaller. Any form of treatment ought to yield the best results in this early group. Only 6 per cent of our cases at that time were considered operative on admission. Ten per cent had metastases and involved lymph nodes when first seen and 9.5 per cent were apparently hopeless from any point of therapy. Seventy-two and one-half per cent were considered inoperable.

Today these figures ought to be better, because of the increase in cancer education of the laity and the profession, which should bring more early cases. Although I have no statistics to prove the point, I feel that the figures have not improved as much as one would expect, for we are still confronted with the problem of handling a large number of advanced cases. With the newer methods of therapy, as described by Dr. Merritt, where more irradiation can be delivered to the deep-seated tumor, definite improvement in future statistics is to be expected.

I agree heartily with Dr. Merritt's plan of a radiological test to determine the sensitivity of the tumor. Histological classification is always helpful, but not absolutely accurate. Not uncommonly in the rectum, as elsewhere, two tumors looking similar microscopically will respond differently to irradiation. The location of the tumor also has a great deal to do with the choice of treatment. Those which are low down and involve the anal orifice can be dissected, either before or after irradiation, with little interference with the operative procedure, particularly since electrosurgery is at our command. Many times it is advantageous to have a colostomy performed before beginning irradiation in order to reduce infection.

At the tumor clinic of the University of Maryland Medical School we usually treat as follows. If the case is operable, it is turned over to the Proctological Department, under Monte Edwards; if it is not operable, the patient is sent to the Roentgenological Department, where Henry J. Walton gives the following therapy: four or five ports around the pelvis and perineum are chosen. Through each port 1,600-2,000 R are given, so that an average of 6,000-8,000 R are delivered through the pelvis as a total. A lesser amount is applied through the perineal portal. A Thoreau filter is used and the formula is 200 kv., 20 ma., 50 cm. S. T. D. In six to eight weeks following the course of therapy radium is applied directly to the tumor itself. We usually give from 1,000-2,000 mg. hours, filtered through 1 mm.

platinum, aluminum foil and rubber. Application is made as uniformly over the tumor as possible and the normal bowel protected. This method of treatment gives us the most satisfactory results.

Dr. Harry A. Miller, Baltimore, Md.—We are again indebted to Dr. Merritt for calling attention to a malignant entity which lies in the broad borderland between the strictly radiosensitive and the resistant lesions.

If we are to draw conclusions from this work, it seems evident that we ought to include the radiotherapeutic test as a necessary part of our pathologic armamentarium. Many of the sections we see of rectal tumors are only indicative of the result to be expected, and are not conclusive. It is impossible to gain a pathological impression of a tumor from a single, or even several sections. Frequently the amount of infection in and about the lesion plays a vital part in its subsequent behavior, both operatively and in its reaction to irradiation. Many of these tumors are heavily infiltrated with lymphoid cells.

The test of radiosensitivity, in addition to giving a further clue to the nature and prognosis of the process, will aid considerably in localizing the process for operation. In addition, this form of therapy obviates the necessity for colostomy.

In the advanced carcinoma of the rectum, the maintenance of a patent lumen by radiation therapy has been very much neglected in favor of permanent colostomy. Why this should be so is difficult to understand. I have repeatedly kept patients with enormous lateral extension free of colostomy until their death from metastasis; and this is the experience of many other radiologists.

In concluding it ought to be pointed out that the operative procedures from carcinoma of the rectum are becoming more and more drastic. True, the percentage of cures claimed has increased, but with this extension of the dissection has come more and more disability.

Unfortunately, the radiation work that has been done has been exceedingly variable, and conclusions are difficult to draw. From what one can gather, the larger series of cases show a marked similarity of result in the hands of radiologists and surgeons, as far as percentages are concerned. Combined treatment appears to be considerably better in the resistant types.

Review of the literature on rectal cancer is extremely difficult because of another factor which is exceedingly important in evaluation. There is very little in common between carcinoma in the recto-sigmoid area, ampulla and anorectal regions. The glandular drainage, metastatic predilection and the cellular pathology all vary greatly, and this probably explains many differences in results. Certainly the surgery and radiotherapy of these lesions differ greatly and ought not to be lumped together.

I am happy to find that Dr. Merritt has committed himself for radium packs rather than radon intratumorously, as I have long believed that the difficulty of properly spacing radon seeds and their relatively light filtration brings about undue slough in the rectum.

The radiotherapeutic test of carcinoma of the rectum cannot be too vigorously advocated.

THE ASSOCIATED INCIDENCE OF TUBERCULOSIS AND MALIGNANT TUMORS*

SPECIAL REFERENCE TO INTRATHORACIC TUBERCULOSIS AND CARCINOMA OF THE ALIMENTARY CANAL

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Through necropsies it has been shown† that active tuberculosis and malignant tumors are frequently found as concomitant lesions. The association of the two conditions is more likely to occur in members of the white race above 35 years of age, and especially where the neoplasm involves the digestive or respiratory tracts.

SOURCE OF MATERIAL AND INTERPRETATION

The material for this study was obtained from the protocols of 396 consecutive necropsies performed by members of this Department during the period of September 1, 1922, to May 19, 1936. It was deemed advisable to exclude the records of 42 necropsies, either because they were incomplete, on stillborns and infants, or there was insufficient data. The summation is, therefore, based on the records of 354 necropsies performed on individuals 1 year of age or older.

Depressed apical pulmonary scars, the healed Ghon lesion, and other fibrosed or calcified tubercles were evaluated as inactive tuberculosis. Caseation necrosis, Langhan giant cell and epithelioid tubercles were considered as indicative of activity. Histopathology was the basis for the latter grouping in practically all cases.

General Incidence.—The 354 cases were divided into three general groups:

	No. Cases	Per Cent
Malignancies	73	20.62
Active tuberculosis	89	25.14
Others*	212	59.88
	374	105.64
Cases counted twice, the double lesion group	20	5.64
	354	100.00

*Those cases showing no evidence of active tuberculosis or a malignant tumor. This term is used with the same significance in other calculations.

*Read in Section on Pathology, Southern Medical Association, Thirtieth Annual Meeting, Baltimore, Maryland, November 17-20, 1936.

*From the Department of Pathology, University of Missouri School of Medicine, Columbia, Missouri.

†Moore, Robert M.; and Schmeisser, Harry C.: Tuberculosis and Malignant Tumors. To be published.

The 20 cases counted twice indicate instances in which active tuberculosis and a malignant tumor existed concurrently. If a comparison is made between this double-lesion group and the total number of cases in each of the two diseases, it is found that 22.47 per cent of this series with active tuberculosis also had a malignancy, while 27.40 per cent of those with a malignancy had active tuberculosis.

Because of the high cancer incidence in this series, 20.62 per cent, the percentage relationships are unquestionably out of proportion for the general population. In this community physicians are more prone to obtain necropsies on patients of the cancer age than from college students, who constitute a high percentage of the local residents. On the other hand, the incidence of active tuberculosis in this necropsy series, 25.14 per cent, was practically the same, 24 per cent, as found elsewhere.[1] If no differentiation is made between activity and inactivity, it is seen that 223 cases, 62.99 per cent, at necropsy showed evidence of tuberculosis, and of this group, 55, or 24.66 per cent, had a malignant tumor.

Age Incidence.—The cases were divided into two age groups: (1) between 1 and 35 years, containing 106 cases, and (2) 35 years of age and over, 248 cases.*

	1 to 34 yrs.		35 yrs. plus	
	No. Cases	Per Ct.	No. Cases	Per Ct.
Malignancies	8	7.55	65	26.21
Active tuberculosis	25	23.58	64	25.80
Others	75	70.75	137	55.24
	108	101.88	266	107.25
Cases counted twice, the double-lesion group	2	1.88	18	7.25
	106	100.00	248	100.00

The incidence of the double lesion in each age group compared with the total number having active tuberculosis and a malignant tumor was: (1) 8 per cent of those in the younger age group who had active tuberculosis also had a malignancy as contrasted with 28 per cent, or three and one-half times as many in the older age group, and (2) 25 per cent of those of the younger ages who had a malignancy also had active tuberculosis, while it was 27.69 per cent for the older age group.

Without differentiation between active and inactive tuberculous lesions, it was found that 46 individuals, 43.39 per cent, in the younger age group showed evidence of tuberculosis, whereas in the older group there were 177 individuals, or 71.37 per cent. Of these two groups, 10.86 per cent of the first, and 28.24 per cent of the latter, also had a malignant tumor.

Sex Incidence.—There were 232 males and 122 females.

	Males		Females	
	No. Cases	Per Ct.	No. Cases	Per Ct.
Malignancies	42	18.10	31	25.41
Active tuberculosis	57	24.57	32	26.23
Others	144	62.07	68	55.73
	243	104.74	131	107.37
Cases counted twice, the double-lesion group	11	4.74	9	7.37
	232	100.00	122	100.00

This comparison reveals that the incidence of active tuberculosis and malignant tumors, each as an entity, was higher in the female than in the male, and consequently the incidence of the double lesion group was greater in the female, 7.37 per cent, than in the male, 4.74 per cent. The incidence of the double lesion in each sex as compared with the total number of tuberculous cases and malignancies was: (1) 19.30 per cent of tuberculous males also had a malignancy, as contrasted with 28.12 per cent for females, and (2) 26.19 per cent of the males with a malignancy had active tuberculosis, while it was 29.03 per cent for females.

Race Incidence.—There were 262 members of the white race and 92 of the Negro race:

	White		Negro	
	No. Cases	Per Ct.	No. Cases	Per Ct.
Malignancies	63	24.05	10	10.87
Active tuberculosis	72	27.48	17	18.48
Others	145	55.34	67	72.82
	280	106.87	94	102.17
Cases counted twice, the double-lesion group	18	6.87	2	2.17
	262	100.00	92	100.00

The incidence of the double lesion as well as that of malignancy in general was appreciably higher in the white than in the Negro race. The incidence of the double-lesion group in each race as compared with the total number of active tuberculous cases and malignancies was: (1) 25 per cent of the white race who had active tuberculosis also had a malignancy, as compared with only 11.76 per cent for the Negro race, and (2) 28.57 per cent of white people with a malignant tumor had active tuberculosis, while it was 20 per cent for Negroes.

*This age division was chosen because the latter group is considered the "cancer age," yet malignant tumors other than carcinomas are included in this study.

SPECIFIC MALIGNANCY-TUBERCULOSIS COMBINATIONS

The above calculations were based on the number of malignant tumors without regard to their several types. The 73 cases of malignancy were found to be: carcinoma, 53; sarcoma, 10; hypernephroma, 4; mesothelioma, 2; Hodgkin's disease, 2; malignant glioma, 1; and malignant thymoma, 1.

Active tuberculosis was found associated with carcinoma in the following 12 instances:

Case 1.—Breast carcinoma, left, recurrent (radical amputation two years prior to death), metastases to ribs, multiple; right pleura and liver; active tuberculosis of left lung and tracheobronchial lymph nodes, bilateral; inactive tuberculosis of liver and right pleura; white female, aged 50, A-24-11.

Case 2.—Breast carcinoma, left (two recurrences following surgical amputations, duration said to be twenty years), with carcinoma *en cuirasse* and metastases to opposite breast, both axillae and other regional lymph nodes, tracheobronchial lymph nodes, mediastinum, pleurae, pericardium, wall of left ventricle, and intra-abdominal lymph nodes; active tuberculosis of left peribronchial lymph nodes; inactive tuberculosis of left peribronchial lymph nodes; white female, aged 70, A-28-10.

Case 3.—Breast carcinoma, right, without metastases; active and inactive tuberculous lesions of right kidney; inactive tuberculosis of liver, lungs and tracheobronchial lymph nodes, bilateral; white female, aged 77, A-35-14.

Case 4.—Breast carcinoma, left, recurrent (simple mammectomy eighteen months prior to death), metastases to regional lymph nodes, diaphragm, right pleura, left tracheobronchial lymph nodes, adrenals, stomach, mesenteric lymph nodes and right ribs; active tuberculosis of left tracheobronchial lymph nodes; no inactive tuberculosis; white female, aged 36, A-35-17.

Case 5.—Pancreatic carcinoma with multiple metastases to liver, bile passages, and duodenum; active tuberculosis of right lung; inactive tuberculosis of lungs, bilateral; white male, aged 83, A-22-12.

Case 6.—Pancreatic carcinoma with metastases to spleen, liver, right kidney, and stomach; active tuberculosis of right tracheobronchial lymph node; inactive tuberculosis of right lung and tracheobronchial lymph nodes; white male, aged 75, A-36-16.

Case 7.—Pancreatic carcinoma with metastases to abdominal wall, liver, upper ileum and intra-abdominal lymph nodes; active tuberculosis of left lung; inactive tuberculosis of lungs, bilateral, and spleen; white male, aged 65, A-36-17.

Case 8.—Gastric carcinoma with metastases to abdominal wall, omentum, regional lymph nodes, liver, gallbladder, intestines, and left visceral pleura; active tuberculosis of lungs and tracheobronchial lymph nodes, bilateral; inactive tuberculosis of tracheobronchial lymph nodes, bilateral; white male, aged 68, A-35-13.

Case 9.—Gastric carcinoma with extensive intra-abdominal metastases; active tuberculosis of right tracheobronchial lymph node; inactive tuberculosis of tracheobronchial lymph nodes and lungs, bilateral; white male, aged 70, A-36-8.

Case 10.—Gallbladder carcinoma with metastases to liver and stomach; active tuberculosis of tracheobronchial lymph nodes, bilateral; inactive tuberculosis of spleen, lungs, and tracheobronchial lymph nodes, bilateral; white female, aged 70, A-29-5.

Case 11.—Uterine carcinoma with metastases and extension to neighboring structures; active tuberculosis of right tracheobronchial lymph nodes; inactive tuberculosis of spleen, tracheobronchial lymph nodes and lungs, bilateral; white female, aged 48, A-36-11.

Case 12.—Skin carcinoma (basal cell of forehead) without metastases; active tuberculosis of tracheobronchial lymph nodes, bilateral; inactive tuberculosis of tracheobronchial lymph nodes and lungs, bilateral; white male, aged 56, A-33-24.

The other eight cases of combined malignancy and active tuberculosis were as follows:

Case 13.—Hypernephroma, right, renal, without metastases; active tuberculosis of mesenteric lymph nodes; inactive tuberculosis of tracheobronchial lymph nodes and lungs, bilateral, right pleura, and liver; Negro male, aged 42, A-35-7.

Case 14.—Hypernephroma, right, renal, with metastases to peri-aortic lymph nodes, lungs, and tracheobronchial lymph nodes, bilateral; active tuberculosis of tracheobronchial lymph nodes, bilateral; inactive tuberculosis of lungs, bilateral; Negro male, aged 65, A-35-43.

Case 15.—Hypernephroma, right, renal, with metastases to lungs, bilateral, right pleura, ribs and intercostal structures, multiple; active tuberculosis of tracheobronchial lymph nodes, bilateral; inactive tuberculosis of lungs and tracheobronchial lymph nodes, bilateral; white male, aged 57, A-35-28.

Case 16.—Dural mesothelioma without metastases; active tuberculosis of tracheobronchial lymph nodes, bilateral; inactive tuberculosis of liver and tracheobronchial lymph nodes, bilateral; white female, aged 48, A-36-20.

Case 17.—Pulmonary fibrosarcoma without metastases; active meningeal tuberculosis and of the right tracheobronchial lymph nodes; inactive tuberculosis of right lung and tracheobronchial lymph nodes; white female, aged 34, A-24-23.

Case 18.—Retroperitoneal lymphosarcoma without metastases; active and inactive tuberculous lesions of right lung; white male, aged 6, A-27-2.

Case 19.—Hepatic fibrosarcoma with metastases to spleen and omentum; active tuberculosis of lungs, bilateral; inactive tuberculosis of lungs and tracheobronchial lymph nodes, bilateral; white male, aged 47, A-30-5.

Case 20.—Cervical lymphoblastic sarcoma, right, with metastases to left cervical lymph nodes, right pectoral muscles and kidneys, bilateral; active tuberculosis of tracheobronchial lymph nodes, bilateral; inactive tu-

berculosis of lungs and tracheobronchial lymph nodes, bilateral; white female, aged 70, A-34-16.

DISCUSSION

In the 53 cases of carcinoma, the 12 instances of concurrent active tuberculosis comprised 60 per cent of the malignancy-tuberculosis combinations.

The primary growth in 28 of the carcinoma cases was located in the digestive system as follows: esophagus, 1; stomach, 11; pancreas, 6; gallbladder, 3; colon, 4; and rectum, 3. Of these 28 cases, six, or 21.42 per cent, were associated with active tuberculosis and constituted 50 per cent of the cases of combined carcinoma and active tuberculosis. The locations of the carcinomas in these six double-lesion cases were: stomach, 2; pancreas, 3; and gallbladder, 1. The two cases of gastric carcinoma associated with active tuberculosis comprised 10.52 per cent of the 19 cases of primary carcinoma of the alimentary tract proper and 18.18 per cent of the 11 cases of primary carcinoma of the stomach. The three cases of pancreatic carcinoma associated with active tuberculosis represented 50 per cent of the cases of carcinoma of that organ, and each one showed metastases to either the stomach or upper portion of the small intestine. Of the three cases of primary carcinoma of the gallbladder, one was associated with active tuberculosis. This case had metastases to the stomach, while the two cases of gallbladder carcinoma not associated with active tuberculosis had no such gastric involvement.

Of the four primary carcinomas of the breast associated with active tuberculosis, one showed metastases to the stomach and was one of two in a total of 10 cases of primary carcinoma of that organ to do so. In six cases of metastatic carcinoma of the stomach or upper part of the small intestine, there was a concurrent active tuberculosis in five, 83.33 per cent.

In 63 cases of primary carcinoma of the alimentary tract proper, obtained by combining the totals of this and another necropsy series,[1] 11 cases, or 17.46 per cent, revealed a coincident active tuberculosis. The carcinoma in these double lesion cases was located as follows:

Primary Tumor	No. Cases	Double Lesions	Per Cent
Esophagus	8	2	25.00
Stomach	34	7	20.58
Intestine	21	2	9.52
	63	11	17.46

There is, then, some association between carcinoma of the alimentary canal, particularly when the esophagus or stomach is involved, and active intrathoracic tuberculosis. Is it beyond reason to ask, "Could the presence of tubercle bacilli in a tissue, acting as an irritant over a long period of time, excite a cancerous growth?" The number of instances in which tuberculosis and a primary malignant growth have been reported in the same histologic sections are so rare as to preclude the possibility that tuberculosis is a common etiological factor in cancer. It is even more difficult to assume that an active tuberculous infection of a tissue could excite a malignancy into existence in another proximate or remote organ. In all probability, however, once the two processes exist in activity, each favors the other in its development by lowering the general, or local, tissue resistance, as might any chronic wasting disease favor either.

There is necropsy evidence to indicate that the influence exerted by a malignant tumor upon a co-existing tuberculous infection is greater than that produced by tuberculosis upon cancer. In the 73 cases of malignancy, 20 were associated with active tuberculosis; 35 with inactive tuberculosis; while 18 were not associated with tuberculosis in any form. Inactive tuberculosis was found in 17, or 85 per cent of the 20 cases of combined malignancy and active tuberculosis. In these cases, active and inactive tuberculous lesions were found in the same organ. This, then, indicates that in the majority of instances where both active tuberculosis and a malignant growth are found at autopsy to exist concomitantly, the former resulted from the breakdown of a previously existing inactive lesion. The one exception to this is the association in youth of sarcoma with active tuberculosis. At this age inactive tuberculosis is less common and less extensive than during later years, and sarcomas are notoriously faster in growth than are carcinomas. Both facts indicate that the occurrence of active tuberculosis and a sarcoma in youth is probably one of chance.

CONCLUSIONS

(1) Evidence has been presented to show that at necropsy active tuberculosis and a malignant tumor are frequently found to be concomitant lesions.

(2) The concomitant occurrence of active tuberculosis and carcinoma, particularly when the individual is 35 years of age and older, in many cases is due to the breakdown of a pre-

viously existing inactive or latent tuberculous lesion rather than to a reinfection.

(3) The high incidence of association, 21.42 per cent, of active pulmonary and/or tracheobronchial lymph node tuberculosis with carcinoma of the esophagus and stomach is due in the majority of such cases to the activation of a latent tuberculous focus as a result of the cachexias, toxemias and malnutritions that develop from cancers at these sites.

(4) The unaccountable rapidity and unfavorable clinical progress of many cases of malignancy is due to the activation of a latent tuberculous lesion.

(5) In the reactivation of tuberculosis in elderly patients, a malignancy is to be considered a factor in more than 20 per cent of the cases.

(6) There is almost a four times greater incidence of active tuberculosis, with a concurrent malignancy in the age group above 35, to that below, the respective percentages being 7.25 and 1.88.

(7) The incidence of the double lesion is greater in the female sex than in the male, as indicated by the percentages of 7.37 and 4.74.

(8) The incidence of the double lesion is greater in the white than the Negro race, as shown by the percentages 6.87 and 2.17.

(9) Although the greater incidence of active tuberculosis and malignant tumors as entities, and as combined double lesions was in the female sex, this series of cases definitely reflects carcinoma of the digestive tract to be of a relatively higher incidence rate in the male sex.

(10) The association of sarcoma and active tuberculosis in youth is comparatively rare and is probably one of chance coincidence.

DISCUSSION (*Abstract*)

Dr. Hugh R. Spencer, Baltimore, Md.—It is well recognized that certain diseases may be predisposing or direct factors in the production of others. Common examples are diabetes and peripheral arterial disease, rheumatic cardiovascular disease and subacute bacterial endocarditis, silicosis and tuberculosis.

In the matter of actual antagonism between diseases, the information is less specific. The older writers have stressed the point of an antagonistic relationship between cancer and tuberculosis. Pearl (Amer. Jour. Hygiene 9:97-159, 1929) also concluded that there was a marked incompatibility between these diseases. Carlson and Bell (Jour. Cancer Research, 13:126-136, 1929), Fortune (Ann. Int. Med., 3:495-500, 1929), E. B. Wilson (Amer. Jour. Cancer, 16:227-250, 1932), and the present authors, present statistics which apparently show no antagonism between cancer and tuberculosis; their evidence is in favor of some degree of positive association.

In the past 1,000 consecutive autopsies at the University Hospital, there were 114 postmortem examinations made on persons dying of malignant disease, an incidence of 1:8.7. These include a wide variety of tumors. There were 84 carcinomas and of these the stomach (14), the lungs (12), the colon and rectum (9), the pancreas (6), the kidney (6) the esophagus (5), and the prostate (5) in order named, were the most common sites of primary growths. Of other tumors there were 16 gliomas of the brain, 3 meningiomas, 8 lymphosarcomas, 1 thymic tumor and 2 fascial sarcomas.

Definite evidence of slight, moderate or extensive active tuberculosis was observed in 10 of the 114 cases of malignant disease, an incidence of 1:11.4 or 8.7 per cent. In the 886 cases in the non-malignant group, there were 71 with active tuberculosis, an incidence of 1:12.4 or 8.01 per cent. The incidence of active tuberculosis in the malignant and non-malignant series is, therefore, practically identical.

In the face of accumulating evidence, one is, I think, forced to abandon the view that cancer and tuberculosis exert antagonistic influences one upon the other.

Indeed, it is recognized that cancer may develop in the lesions of lupus vulgaris. Ewing writes, "It seems highly probable that many cases of lymphosarcoma arise on a tuberculous basis." It has been long thought that sarcoma of the lung, especially the squamous cell type, may develop in or about old tuberculous cavities. This seems possible since in various types of inflammatory processes involving the bronchi one not infrequently sees squamous metaplasia. Some years ago I saw a squamous cell carcinoma which had developed in the wall of an old abscess cavity. The abscess had followed a tonsillectomy. Fried (Amer. Jour. Cancer, 23:247-266, 1935) reported 13 cases of bronchogenic carcinoma combined with tuberculosis of the lungs.

Conversely, it is reasonable to assume that the long continued malnutrition associated especially with cancer of the esophagus and stomach may tend to reactivate latent tuberculous foci. I do not believe, except in isolated instances, that reactivated tuberculosis exerts much influence upon the clinical course of cancer.

From the evidence at hand it would seem logical to assume that in certain cases the long continued injury incident to tuberculosis may predispose to cancer and that cancer especially of the esophagus and stomach may tend, because of disturbances in nutrition, to reactivate latent tuberculous foci, but that for all practical purposes in the majority of cases the two diseases should be considered as independent.

Dr. Neal (closing).—No one appreciates more than do the authors the inadvisability of accepting as facts conclusions based on the small number of cases used in this study. It is to be hoped that this presentation will stimulate others with more extensive autopsy services to carry this study on to where large series of cases will be reported and lead to more legitimate conclusions.

The discussion of Dr. Spencer is very valuable, and we appreciate it much, and though his findings are at some variance with ours, one must take into consideration that they are on an entirely different type and class of patients.

CHILDHOOD TYPE TUBERCULOSIS*

SOME PROBLEMS OF A PUBLIC HEALTH ADMINISTRATOR

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The public health administrator, in choosing a program for the control of any communicable disease, and the clinician, in deciding on the management of a case, must base their procedures fundamentally on the known epidemiological facts concerning that disease. The field of tuberculosis in childhood is marked by controversy and confusion. Principal known facts of importance to the administrator in the epidemiology of tuberculosis in children are as follows:

In the United States it is tenth as a cause of death in the first five years of life, eighth in the age group five to ten, second in the age group ten to fifteen, and first from fifteen to thirty-five. The actual number of deaths is large under two years of age. There are practically no deaths from tuberculosis between the ages of two and fifteen. The death rate rises rapidly with puberty.

Both infection and death rates are nearly equal between males and females up to puberty, when the female rates rise earlier and higher than those of males, to fall below the male rates in older age groups.

Different races show marked variations in incidence. Primitive races are notably susceptible. Urban infection and death rates are higher than rural.

The etiological agent is the tubercle bacillus, human or bovine type. The source of infection and transmission to children is practically never through the placenta, but is usually through contact with a tuberculous patient, and to a minor extent today, via infected food, chiefly milk, carrying the bovine bacillus.

Tuberculous infection as measured by a positive tuberculin test alone does not mean disease, except in infants. The sequence of events in pulmonary tuberculosis is a primary or first infection with the bacillus. This usually, but not always, occurs in children and produces the childhood or first infection type of tuberculosis. It involves any part of the lung, but is often subpleural. It tends to heal, producing trivial or no scar, or to fibrose and calcify, producing Gohn tubercles. The prognosis is good. Complications are generalized tuberculosis, miliary, meningeal, bone and joint tuberculosis, and so on.

The adult type of pulmonary tuberculosis usually begins in young adults or late adolescents. It usually involves the upper third of the lung and tends to fibrosis, caseation and cavitation. Prognosis is poor in children and the generalized complications are unusual in adults. Involvement of the regional lymph nodes occurs in both types.

That the first infection, if not overwhelming, produces some degree of immunity entirely relative and best stated as heightened resistance, is accepted by practically everyone. It also produces allergy to tuberculo-proteins, which is the cause of positive tuberculin reactions. It is known that in acute infections such as measles, scarlet fever and whooping cough, in pregnancy, and in far advanced widespread tuberculosis, tuberculin will temporarily fail to produce a reaction.

There are usually no symptoms in cases of childhood type tuberculosis and physical examinations will not reveal the condition. The diagnosis must be made on the basis of a combination of history of exposure, tuberculin test, and x-ray. Laboratory examinations are rarely of aid. Sputum is usually swallowed. Examination of stomach washings and feces may reveal the bacilli.

X-rays of childhood type tuberculosis are difficult of interpretation, and should be sent for interpretation to those who have had considerable experience with this type of plate. For this same reason, the roentgenographic technic should be good. Many private practitioners doing a small amount of x-ray work do not produce films of the necessary quality.

It has been shown repeatedly that the majority of adult type pulmonary tuberculosis cases of the future come from tuberculin positive children of today.

The controversial questions in this field which confound the teacher, public health administrator and clinician are first and most important: our lack of knowledge of the fundamentals of immunity. Koch demonstrated that the first injection of tubercle bacilli into healthy guinea-pigs produces transient inflammation followed by local nodule, necrosis and ulceration, and by generalized tuberculosis; whereas injection into the previously infected pig produces immediate

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violent local inflammation, necrosis, and ulceration, which tends to heal. This resistance to reinfection on the part of previously infected animals has naturally led to correlation of increased resistance with the allergic state. The hypothesis that allergy means increased resistance must be understood to be relative resistance, since thousands of patients with positive tuberculin tests die of tuberculosis. In further support of this theory a low incidence of adult type disease has been noted in regions where scrofula was frequent in children. Furthermore, studies on relatively small groups of nurses, totalling about 400, have shown more clinical tuberculosis occurring in those nurses who were tuberculin negative at the beginning of their training periods. In general, European countries base their tuberculosis control programs for children on this hypothesis, using some form of vaccine until the allergic state is induced. This school of thought holds that "it is a good thing for an adult to have a positive tuberculin test" on the theory that such individuals are thereby more resistant. On the same basis they argue against the future of any program of tuberculosis control which attempts to eliminate the disease without maintaining or increasing our present general level of resistance, on the theory that if the disease were ever re-introduced our population would have lost its resistance.

A comparatively new school of thought, chiefly American, opposes these views either in part or in whole. It was found that animals injected intravenously with killed tubercle bacilli did not become tuberculin positive, yet responded with the resistant type of reaction to reinfection with living organisms. Furthermore, allergic animals could be desensitized and still show increased resistance. On the basis of this and other experiments, Rich and others conclude that allergy and immunity are entirely independent and that allergy is definitely harmful. Rich gives convincing evidence against the theory that allergy by quickening the body reactions, walls off the bacilli, preventing spread to the regional nodes and other parts of the body.

Myers found that tuberculin positive children develop adult type disease in later years five times as often as similar groups of tuberculin negative children, and states that their contacts with open cases were broken in so far as possible. On the basis of his findings he interprets a positive tuberculin reaction as a double liability, first, because of the danger of endogenous reinfection; and second, because of allergy which causes destructive types of lesions. Opponents interpret his findings to be that the tuberculin positive children develop more clinical disease because of more or less continued exposure, that is, exogenous reinfection, and that the tuberculin negative children did not experience intense exposure. In further support of this new or American school of thought, other studies of larger groups of nurses entering training have shown opposite results, that is, more adult disease occurring in the tuberculin positive group. Exponents of this hypothesis attack the evidence provided by studies on the use of vaccines in infants on the basis of poor statistics, lack of proper controls.

Many confusing problems present themselves to the administrator in deciding whether or not to institute widespread tuberculin testing. In the past it has generally been considered that a positive tuberculin test was significant in infants, that its importance gradually declined with advancing age until it was of no value in adults. This was based on several facts: first, a positive test in infants was important because it meant contact in the home with an open case, and such contacts meant often repeated massive doses because of handling of infants, crawling, and so on. It also meant that the infant could not have healed the lesions because of lack of time, and it connoted the dangers of miliary and meningeal complications with high mortality rates. Second, in the group from two to fifteen there are practically no deaths from tuberculosis and very few adult type cases are found. Many consider the finding of active childhood type tuberculosis of relatively little importance, insignificant in comparison with finding adult cases. Third, we formerly believed that by the time adulthood was reached practically everyone had been infected and was tuberculin positive. Recent studies have shown that increasing percentages of adults are tuberculin negative and the test is therefore correspondingly becoming more significant in older age groups. The administrator must decide whether childhood type tuberculosis is in itself of enough importance to justify the time and expense spent in looking for it. Those who find it justifiable usually do so on the basis of the fact that most cases of adult type come from this group, and the hope that they can be prevented. Should he so decide, tuberculin testing would be applied to all children. Should he decide that it is important only to find severe childhood and adult type cases, he would restrict the routine use of tuberculin testing in the general popula-

tion to definite age groups, probably under two and over fourteen and to child contacts with known cases regardless of age. Or he might further concentrate on the group of contacts, eliminating the general population, thus using it only as a supplement to the diagnostic clinic.

Miss Downes has recently questioned the effectiveness of tuberculin testing and x-raying of school children, in comparison with the diagnostic clinic, on the basis of results in Cattaraugus County, New York, where no new adult cases were found through the first procedure; whereas from 2 to 10 per cent of all patients referred from various sources to diagnostic clinics were found to be clinical cases. Brown has ably defended the unrestricted program. From much larger areas, including Cattaraugus County, he finds 2.5 per cent of the x-rays of adults from homes of tuberculin positive school children show new cases of active tuberculosis and that this procedure leads to the finding of a greater per cent of early cases than the diagnostic clinic; that it also stimulates the entire health program; that the cost per diagnosis is not high in view of the early stages found, and that when the complete program, which includes examination of adult contacts to tuberculin positive children, is included, the cost is greatly reduced. Furthermore, this complete program becomes more important in view of the fact that almost half of 496 pulmonary tuberculosis cases in New York State in 1934 came from non-contact environments.

The administrator also faces the problem of securing x-rays of proper quality and their interpretation for the tuberculin positive group, the cost involved, and possible objection from private practitioners, particularly roentgenologists.

If all these problems have been solved and the program is decided upon, the first step should be education of physicians in the field. The final decisions as to management and care of cases will always rest with the family physicians. If they feel, as many do, that a tuberculin test is of no value, the program will suffer because the parents go to them for advice. They must realize that in the present state of controversy a positive test means only previous infection and allergy and that no prognosis of any kind can be made until after a study of the x-ray.

Each practitioner must be conversant with the principles of management of childhood type tuberculosis cases in order to advise parents properly.

Finally, it has been said that merely finding the cases is futile if no home nor community facilities are provided for those needing care. Such a statement must be qualified. The mere fact that the case is known, is of value in itself. If sanatorium or preventorium beds or maintenance funds are limited, the administrator should remember that in general, hospitalization of adult type cases is more important than childhood type. After breaking contact by hospitalizing the adult case, education in the home by the public health nurse in general hygiene will suffice for most of the childhood cases.

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DISCUSSION (*Abstract*)

Dr. Horton Casparis, Nashville, Tenn.—Dr. Grayson and Dr. Smith have very appropriately brought out the confusion existing at present concerning the so-called childhood type of tuberculosis. This confusion exists, I think, because we have failed to recognize in the first place that from a practical standpoint tuberculosis is tuberculosis regardless of the age of the patient in which it occurs. In other words, the so-called childhood type of response is nothing more nor less than the response of the individual to the first infection, and this first infection can occur at any age and does occur frequently beyond the age of childhood. On the other hand, the so-called adult type of response is nothing more nor less than the reinfection type, and this also can and does occur at any age.

In the second place, confusion frequently creeps in when we attempt to build up a prevention and control program largely because many of us who write and talk about tuberculosis wander off into the more pleasant by-ways of academic discussion rather than stick to the straight, broad highway well marked by the definite indications for the prevention and control of tuberculosis. This highway is straight, but it does have rough places and bumps in it. These rough places and bumps are not an indication of lack of scientific information concerning prevention and control of tuberculosis, but are an indication of the difficulty which we have in getting this information used by physicians and laymen alike.

As just mentioned, the approach to the goal is well marked and the goal is definite. Our goal is to find as much tuberculosis as possible in its various stages of development all the way from tuberculous infection to advanced disease (diagnosis), and then to do as much as possible about that which we find (treatment). There is excellent scientific information available concerning both of these procedures. The amount we accomplish will depend on the extent to which we prepare ourselves to take advantage of this information and to the extent that we procure facilities to get it used by those who should be concerned with prevention and control.

In finding tuberculosis one never limits oneself to a single method, but uses all available methods, emphasizing this or that one which seems to produce the best results in one's own community with the facilities that are available. For example, if tuberculin testing children for the sake of making an early diagnosis in them, and for the purpose of using the positive ones for clues to sources of spread, seems to be effective in one's community, then that method could be emphasized, but never to the exclusion of the advantages of other methods.

So often in a community it is possible in the beginning to do only case finding, since facilities for care of those found are not yet available. This should be recognized by the workers as the necessary first step, but only the first step. However, even going this far has definite value, because if danger spots are pointed out to us, we can and usually do try to avoid them to some extent until something can be done to take care of or remove the source of danger.

ANTERIOR PITUITARY INSUFFICIENCY*
(SIMMONDS' DISEASE)
REPORT OF A CASE

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Enlargement of the pituitary in a patient with gigantism was reported by Fritsche and Klebs[1] in 1884, and shortly after Minkowski[2] suggested the relationship between the hypophysis and acromegaly. Tamburini,[3] in 1894, recorded a series of cases showing that hypophyseal enlargement was the cause of human pathological overgrowth. The possible effects of pituitary insufficiency were not investigated until Paulesco[4] showed in 1907 that extirpation of the canine hypophysis produced weakness, emaciation and death. Simmonds,[5] in 1914 reported the first human presenting the symptoms observed by Paulesco in dogs and subsequently (1916, 1918) four other such patients. A number of cases have since been recorded and Graubner[8] in 1925 and Calder[9] in 1932 summarized the literature. Clinically, these patients have presented asthenia, emaciation, chilliness, abdominal pain and constipation, hypotension, trophic changes in the integument, lowered basal metabolic rate, amenorrhea and loss of libido. Pathologically, they have been characterized by destruction of the anterior lobe of the pituitary with secondary atrophic changes in the thyroids, suprarenal cortex, parathyroids, gonads, and decrease in size of all abdominal organs ("Splanchnomikrie"). The destructive changes in the anterior pituitary were due to tuberculosis, tumors, embolism, thrombosis, syphilis, trauma.

In 1927 Smith[10] produced in rats a syndrome analogous to the clinical picture presented by the human victims of Simmonds' disease. He showed that extirpation of the anterior pituitary lobe invariably resulted in cachexia, atrophy of the entire genital tract, loss of libido, cessation of the female sex cycle, atrophy of the thyroids, parathyroids and suprarenal cortex. He demonstrated also that replacement therapy in these animals was followed by return to a relatively normal state. Thus he furnished a scientific rationale for the specific treatment of anterior pituitary deficiency in humans.

There is considerable difference of opinion as to the number and character of the anterior pituitary hormones. However, the consensus of authoritative opinion accepts at least 2, as reported by Evans and Simpson[11] in 1929: (1) a growth promoting hormone; and (2) a gonad, thyroid, suprarenal cortex stimulating hormone. Most of the reported cases of pituitary cachexia which have recovered were treated parenterally with extracts of the anterior pituitary. In a few instances improvement has occurred following treatment with posterior pituitary extract or anterior pituitary gonad stimulating hormone.

Calder[9] has observed that the treatment and therapeutic response in patients depend upon the duration of the disease. In the early stages insufficiency of the thyroid, gonads or suprarenals rests upon a functional basis and supplying the missing pituitary hormone should reactivate these structurally competent glands.

> "If, on the other hand, the disease has endured for a long time, then anatomical changes * * * of disuse atrophy will have set in, and * * * it is reasonable to assume that not only the pituitary hormone but also those of the secondarily involved glands may be required in order to relieve the symptoms."

The exact dosage and the duration of treatment apparently must be worked out for each individual patient. Weinstein[14] points out that

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regeneration of anterior pituitary substance is possible and that remissions and exacerbations may occur in this disease over a period of many years.

Seitz,[12] in 1935, discussed the hypophyseal disturbances that occur during pregnancy and following delivery, attributing them to the functional strain of the former and hyperinvolution of the hypophysis following the latter. Berman[13] suggests that a mild underfunctioning of the anterior pituitary may be the cause of certain severe cases of juvenile, adolescent and adult malnutrition which fail to respond to the usual therapeutic measures. Kraus[15] reported that in cases of Addison's disease due to tuberculosis of the suprarenals there are few, if any, changes in the pituitary; while in those cases dependent upon "sclerosis of the suprarenal cortex" there are striking degenerative changes in the anterior lobe of the hypophysis which are to be regarded as primary. Similar observations have been recorded by others.[16 17] Calder[9] writes:

"One can hardly escape the interpretation that cases of 'Addison's disease' such as those mentioned above as being due to idiopathic sclerosis of the suprarenal cortex are not due primarily to disease of the suprarenals, but to atrophy and underfunctioning as a secondary effect of anterior pituitary insufficiency."

He suggests by implication that patients with "Addison's disease" may be benefited by administration of anterior pituitary extract.

The following case is reported because:

(1) It is a classical example of Simmonds' disease in a young girl,

(2) As pointed out by Calder,[11] Seitz[12] and Berman,[13] anterior pituitary insufficiency is probably more common than has been realized,

(3) Acute suprarenal failure supervened during the course of the disease and responded promptly to anterior pituitary hormone therapy.

CASE REPORT

S. P., a 16½-year-old white girl, one of twins, was first seen March 15, 1934. Her complaints were weight loss, weakness, amenorrhea and constipation of 2½ years' duration.

The birth, developmental and family histories were irrelevant.

Past illnesses included measles, pertussis, varicella, mumps, all mild and uncomplicated. The system review was non-contributory except for tonsillectomy at 5 years and acute otitis media of moderate severity in June, 1931.

The menses began at 12 years, were characterized by a regular 28-day interval, an average flow, and little discomfort. Her diet had always been adequate and her habits normal. She was quite athletic, being unusually proficient at tennis and swimming, and at 14 was a magnificently developed girl weighing 140 pounds.

In the spring of 1932 she began gradually to lose weight and strength. Recurring cramp-like abdominal pain developed for which, after an interval, a normal appendix was removed; the pain continued. Obstinate constipation, amenorrhea, profound asthenia, emaciation, dryness of the skin, loss of scalp and body hair and irritability became prominent symptoms. The body weight fell from 140 pounds to 80. Prolonged hospitalization, various diets, change of climate, thyroid to the point of nervousness (a basal metabolic rate of —25 per cent had been discovered), study by many physicians in various clinics failed to effect improvement. She became so weak that she could scarcely stand.

General examination in March, 1934, revealed emaciation, asthenia, dryness of the skin, brittle nails, sparseness of hair, softness of the teeth, cold extremities, hypotonic muscles, atrophic breasts, an appendectomy scar. Rectal examination revealed a small, retroverted uterus; the liver was small, extending only to the upper border of the sixth rib; a teleroentgenogram showed the heart to be "unusually small" (Splanchnomikrie").

The body temperature was 98° F., weight 83 pounds, height 67 inches, pulse rate 60, blood pressure 80/49, basal metabolic rate —32 per cent. Chemical and microscopic examinations of the blood, urine and stool revealed no abnormalities. The blood Wassermann and Mantoux tests were negative. Clinical and roentgenological studies of the sinuses and teeth disclosed normal findings as did x-rays of the skull and abdomen. The glucose tolerance test revealed findings similar to the curve of mild diabetes, but glycosuria and fasting hyperglycemia were absent. Subcutaneous injection of 4 minims of epinephrine produced a rise in blood pressure of 35 points, which was sustained for 30 minutes. The blood calcium was 10.9 mg. per cent; phosphorus 3.6 mg. per cent; specific dynamic effect of proteins normal.

The clinical impression was anterior pituitary insufficiency (Simmonds' disease). Treatment was begun with 1 c. c. daily of an extract of the anterior pituitary, injected subcutaneously. In ten days she had gained 14 pounds and felt immensely improved, so much so that she impulsively played two sets of tennis. This exertion caused a virtual collapse, exhaustion forcing her to remain in bed, and occasioned a weight loss of 9 pounds. The blood chlorides were 336 mg. per cent (normal by that method 570-620), nonprotein nitrogen 47 mg. per cent. It was felt that acute suprarenal insufficiency had supervened, secondary to anterior pituitary deficiency, but precipitated by the unwonted physical exertion. The anterior pituitary extract was increased to 3 c. c. daily and 10 grams of extra salt were given by mouth each day for a week. Improvement was steady. In a month her weight had increased to 110 pounds, the blood pressure averaged 105/70, constipation had disappeared, sweating which had been absent for two years was noted. A normal menstrual period occurred three months after treatment was begun. At this time her weight was 115 pounds; blood pressure 120/70; nonprotein nitrogen and blood

chlorides normal; hair growth average; breasts well developed again; interest in boys which had been totally lacking for two years, had returned.

The dose of anterior pituitary extract was gradually reduced after five months' treatment and discontinued entirely after the eighth month. One year following the cessation of endocrine therapy she was leading a normal life, her weight was 122 pounds, blood pressure 120/70, sweating, hair growth, menstrual function, elimination normal. In short, she was completely rehabilitated.

COMMENT

During the past summer she suffered a severe attack of malaria and a cellulitis of the thumb. With each of these infections she lost weight and strength, but amenorrhea, cessation of sweating, constipation, loss of hair did not occur. It appears that anterior pituitary function has returned to the extent that the normal demands of the body may be met, but that when conditions supervene which exert unusual functional strain upon the endocrine system, the reserve is not adequate. It is probable that infection and overexertion will have to be avoided.

The only possible etiological factor suggested by the history was the attack of otitis media in 1931. This was of moderate severity and responded promptly to myringotomy.

SUMMARY

A case of anterior pituitary insufficiency (Simmonds' disease) in a 16-year-old girl is reported.

Complete temporary rehabilitation was effected by parenteral administration of anterior pituitary extract for seven months; the permanence of this remains to be demonstrated.

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DISTURBANCES OF PITUITARY FUNCTION*

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Of all the endocrine glands, the hypophysis holds a dominant position, in part, owing to the striking clinical pictures produced by certain pathological lesions developing in it and, in part, owing to the widespread influence its hormones have on those of other members of the group. Barger has called it the "general headquarters" of the endocrine system. In this communication only the outstanding features of hypophyseal disease can be dealt with. One of the most interesting features, namely, the correlation of the functions of the hypophysis with those of other members of the endocrine system will have to be omitted. One phase of this correlation is to be discussed in one of the other papers to be presented in this Section.

It is my purpose first to summarize what we know concerning the gross anatomy, histology and physiology of the gland.

(I) SUBDIVISIONS OF THE HYPOPHYSIS

(1) The anterior lobe, adenohypophysis.

(2) The posterior lobe or pars nervosa, neurohypophysis.

(3) The intermediary lobe, pars intermedia.

(4) The infundibular stalk.

(5) The pars tuberalis, a thin, epithelial envelope extending up from the pars intermedia and surrounding the infundibular stalk.

(II) EMBRYOLOGICAL DERIVATIONS

(1) The anterior lobe or adenohypophysis is of ectodermic origin and is an offshoot from Rathke's pouch in the nasopharyngeal space.

(2) The posterior lobe or neurohypophysis is of neurogenic origin, as is also the infundibular stalk.

(III) HISTOLOGY OF THE ADENOHYPOPHYSIS

The anterior lobe of the hypophysis contains two main types of cells. These are as follows:

(1) Chromophile cells. These contain granules in the cytoplasm and are subdivided into:

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(a) Acidophilic or eosinophilic cells, which have an affinity for acid dyes. They produce the growth hormone.

(b) Basophilic cells, which have an affinity for basic dyes. They most probably produce the sex or gonadotropic hormones.

(2) Chromophobe cells. In these the cytoplasm is free from granules and does not stain. So far as we are aware at the present time, they produce no hormones. Adenomas of these cells lead to the production of Fröhlich's syndrome or dystrophia adiposa-genitalis, and probably to the pituitary obesities of adults.

Whether these three different forms of cells are fixed in character, or whether they represent different stages in development of the same original "mother cell" is still a matter of dispute. The chief adherent to the latter conception is Remy Collin, of Nancy, France.

Reference should be made here to the Erdheim-Stumma "pregnancy cells" which are also found in the pars anterior. It is well known that during pregnancy the patient develops minor acromegalic signs of the face and hands that are supposed to be due to overactivity of the eosinophilic cells. Cushing states that there has been a suspicion that these so-called "pregnancy cells" are enlarged chromophobe elements arrested in the course of becoming fullblown granular acidophilic cells of the usual type.

(IV) HORMONES OF THE ADENOHYPOPHYSIS

(1) Growth hormone, produced by the eosinophilic cells.

(2) Gonadotropic or sex hormones. These are produced by the basophilic cells. They are of two types:

(a) Follicle-stimulating hormone.

(b) Luteinizing hormone.

(3) Thyrotropic hormone.

(4) Lactogenic hormone, prolactin.

(5) Adrenotropic or interrenotropic hormone.

(6) Pancreaticotropic or diabetogenic hormone.

(7) Parathyroidotropic hormone.

(8) Fat metabolism hormone.

It is important to remember that, up to the present time, none of these hormones has been isolated in pure crystalline form and their chemical formulas have not been determined as have those of epinephrine and thyroxin. Until this is accomplished we must be conservative concerning the interpretation of their physiological actions.

(V) HISTOLOGY OF THE NEUROHYPOPHYSIS

(1) Neuroglial fibers.

(2) Neuroglial cells.

(3) Nerve fibers. These are non-myelinated and are continuous with similar nerve fibers in the stalk and with those in the hypothalmus. They are believed to be connected with certain water regulating centers near the floor of the third ventricle, the nucleus supra-opticus or nucleus paraventricularis, as described by Greving and Pines.

(VI) HORMONES OF THE NEUROHYPOPHYSIS

(1) Vasopressin, the blood pressure raising factor.

(2) Oxytocin, the oxytocic factor that causes contraction of smooth muscle fibers.

(3) Diuretic-antidiuretic factor.

(4) Melanophore-expanding factor.

(VII) HISTOLOGY OF THE PARS INTERMEDIA

The pars intermedia is derived from the adenohypophysis and it has generally been believed that the cells are essentially basophiles. Recent studies by MacCallum have suggested that the cells of the pars intermedia have staining reactions differing from those of the basophilic cells of the adenohypophysis. It is thought by many that some of the functions of the neurohypophysis are due to the migration of cells into it from the pars intermedia producing the so-called "hyaline" bodies of the pars nervosa.

(VIII) HORMONES OF THE PARS INTERMEDIA

In 1932 Zondek and Kohn[1] isolated a hormone which they called "intermedin." It appears to possess two possible actions:

(1) Chromatophorotropic action, its definite effect on the pigment in the cells. It is now generally believed that the melanophore-expanding factor in the neurohypophysis is actually derived from the pars intermedia. In securing material for making extracts from the neurohypophysis it is practically impossible to avoid incorporating some of the pars intermedia.

(2) Possible antidiuretic action, as has been suggested by Sulzberger and Ferguson. It may be demonstrated eventually that the antidiuretic principle in the neurohypophysis is actually derived from the pars intermedia.

(IX) HISTOLOGY AND FUNCTIONS OF THE PARS TUBERALIS

The pars tuberalis is a very thin envelope of epithelial cells extending up from the pars intermedia and surrounding the infundibular stalk. Presumably the cells are of the same type as those of the pars intermedia. No doubt these pars tuberalis cells possess a secretory function, but, owing to the difficulty in securing material for making extracts, we at the present time have no accurate knowledge of the functions of the pars tuberalis.

DISEASES OF THE HYPOPHYSIS

With this preliminary summary of our present knowledge of the functions of the various parts of the hypophysis, we should next endeavor to classify the various diseases or symptom complexes that are believed to be essentially hypophyseal in origin. Later, a brief summary of the main features of some of these diseases will be given. It is important to emphasize that some of these clinical pictures are due to adenomata of either the eosinophilic, basophilic, or chromophobe cells of the adenohypophysis. In other instances, the clinical picture may be due to degenerative changes in the pars anterior or to pressure effects of neighborhood tumors upon the hypophysis.

CLASSIFICATION OF HYPOPHYSEAL DISEASES

(I) *Hyperpituitarism.*—(1) Gigantism, occurring in young persons before the union of the epiphyses and diaphyses. The majority of these cases later become acromegalic giants.

(2) Acromegaly, developing in persons after the union of the epiphyses and diaphyses.

In both of these the abnormality is due to the development of an eosinophilic adenoma of the pars anterior with an overproduction of the growth hormone.

(II) *Hypopituitarism.*—There are three main types.

(1) Fröhlich's syndrome, or dystrophia adiposa-genitalis. This constitutes the most frequent type of pituitary infantilism.

(2) Pituitary obesity in adults, including Dercum's disease or adiposa dolorosa.

Both of these are probably due to chromophobe adenomas of the adenohypophysis or in the supracellar region.

(3) Simmonds' disease or pituitary cachexia.

(III) *Other Forms of Pituitary Disease.*—(1) Cushing's disease or pituitary basophilism.

(2) Diabetes insipidus. This disease was formerly thought to be due to disturbed function of the neurohypophysis. It is generally believed now that the primary lesion originates in the hypothalamus.

A brief discussion of these various pituitary diseases is now in order. Only essential details, however, can be given.

(I) *Acromegaly.*—This disease was first carefully described by Pierre Marie in 1885, but it was not until 1887 that Minkowski first drew attention to its relationship to disease of the hypophysis. It is due to the effects of an adenoma of the eosinophilic cells of the pars anterior, causing an overproduction of the growth hormone, together with secondary alteration in the action of certain of the other pituitary hormones, which may result in a disturbance of the function of other endocrine glands. If the eosinophilic adenoma develops in young persons, before the union of the epiphyses and diaphyses, we get great increase in the height and these cases later constitute the acromegalic giants. Some of these giants reach an enormous height, the record being Malchow, a Russian, who, at 23 years, attained 9 feet 3 inches. Charles Byrnes, John Hunter's famous "Irish Giant," reached a height of 8 feet 4 inches. Sir Arthur Keith says of this skeleton that if Hunter had been able to put his fingers in the giant's huge sella he might have suspected that the pituitary had some relationship to the great height.

The symptoms and signs in the ordinary acromegaly in adults may be classified under two headings:

(1) Those of endocrine origin.

(2) Those representing neighborhood symptoms due to pressure effects.

Among the endocrine effects should be mentioned those due to changes in the osseous system. The long bones are massive and broadened. The hands are broad and spade-like. There is marked prognathism due to the lengthening of the rami of the lower jaw, so that the lower teeth project beyond those of the upper jaw, the reverse of normal. The teeth are separated. The supra-orbital ridges are very prominent and the frontal sinuses much enlarged. There are hypertrophic changes in the extremities and vertebrae at the site of the attachments of tendons and ligaments. The spine in the up-

per dorsal region becomes kyphotic and bent forward. There is striking "tufting" of the terminal phalanges of the fingers and toes. The sella turcica is almost invariably greatly enlarged owing to pressure of the eosinophilic adenoma.

The nose broadens. The lips and ears are enlarged. There is usually marked hypertrichosis. In men diminished libido and potentia and in women amenorrhea generally occur. This is probably, in part, due to secondary disturbance in the action of the gonadotrophic hormone of the adenohypophysis, and, in part, to disturbed function of the gonads in both sexes. The subcutaneous tissue increases as the disease progresses and there is deepening of the fissures on the hands. The tongue broadens. In the early stages there is a diminished carbohydrate tolerance, and, in at least 50 per cent of the cases, there is a hyperglycemia or glycosuria. Later in the disease there may be an increased carbohydrate tolerance with a resultant gain in weight. Time will not permit a discussion of the views held to explain the disturbance of carbohydrate metabolism in the various stages of the disease. The abdominal viscera are increased in size (splanchnomegaly).

Among the neighborhood symptoms due to pressure there may be headache, usually frontal in location, and it may be very severe. Somnolence, epistaxis and rhinorrhea may occur. The ocular features are important. There may be restriction of the fields of vision or hemianopsia. Paralysis of the third nerve or abducens may occur. The pressure effects may become so marked that there may be choking of the discs, and complete blindness may result from damage to the optic tract if the pressure is not relieved.

Concerning treatment, organotherapy so far has had practically no beneficial effect. The judicious use of x-ray therapy should be given a trial. Where there are severe headaches and progressive impairment of vision a hypophysectomy should be performed to relieve the pain and prevent total blindness.

(II) *Fröhlich's Syndrome.*—This type of pituitary infantilism was first described by Fröhlich in 1901. Later Bartels gave the name dystrophia adiposa-genitalis to the condition. It is believed to be due to the effects of a chromophobe adenoma either of the adenohypophysis or of one in the neighborhood region. Experimentally it is simulated by hypophysectomy in puppies in which the condition of cachexia hypophysiopriva is produced, as has been demonstrated by Cushing and his pupils, Dandy, and many others. As compared with the controls the experimental animals remain stunted, become obese, and sexually do not mature.

In the human, boys and girls fail to grow as they should. They are obese. The fingers are tapering. There is hypogenitalism in both sexes and neither boys nor girls sexually mature. There is hypotrichosis, and in boys, if hair does occur on the pubes, it has the transverse distribution as in females. The carbohydrate tolerance is increased. The relative obesity is probably dependent upon the disturbed action of the fat and the pancreaticotropic hormones of the anterior pituitary.

Englehart and others have demonstrated the beneficial effects of organotherapy in these cases by the hypodermic use of potent commercial preparations containing the growth and sex hormones.

(III) *Pituitary Obesity.*—Endogenous obesity in adults is often due to hypopituitarism. Most observers believe these cases to be due to the effects of a chromophobe adenoma of the adenohypophysis or of one in the neighborhood. The cases are more common in women and the victims may reach the enormous weight of 500 to 600 pounds. The "fat lady" of the circus sideshows is usually of the hypopituitarism type. Although the fat distribution is general, it is especially conspicuous in the breasts, abdominal walls and extremities. A characteristic is the so-called girdle or trochanteric distribution. The legs below the knees have usually lost their gracility and there may be fat cuffs above the ankles. An important feature, in holding the arms up, is an enormous, baggy fold of fat between the elbow and armpit. There is usually hypotrichosis and men will have the typus femininus of transverse pubescence. Women are amenorrheic and men have absent libido and potentia. The carbohydrate tolerance is increased and the basal metabolic rate is usually considerably reduced.

The fat in some of these cases may also have a nodular distribution and the nodules are often painful, representing the cases of Dercum's disease or adiposa dolorosa.

From the treatment standpoint, much can be done in these cases in reducing the weight by the giving of a low calorie diet over long periods. If the basal metabolic rate is considerably lowered the judicious use of thyroid preparations is indicated. Potent sex hormones, hypodermically, should be given a thorough trial.

(IV) *Simmonds' Disease or Pituitary Cachexia.*—This most interesting disease was first described by Morris Simmonds,[2] of Hamburg, in 1914. The attention of the profession in this country was drawn to it first by Farquharson and Graham,[3] of Toronto, who reported three cases before the Association of American Physicians in May, 1931. Since then other cases have been reported in this country. In 1932, Calder,[4] of Duke University, analyzed the 70 cases that had been reported in the literature up to that time.

The disease is due to partial or complete destruction of the adenohypophysis. A good many of the cases have followed puerperal infection resulting in septic emboli in the arteries supplying the pars anterior. Other cases have resulted from tuberculosis, syphilis, or from the pressure effects of neighboring tumors, as in Penfield's patient.

The main symptoms of the disease are progressive emaciation; early senility; pale, dry, wrinkled skin; adentia; loss of axillary and pubic hair; amenorrhea and sterility in women and absent libido and potentia in men; low fasting blood sugar; low basal metabolic rate, reaching —20 to —40; low blood pressure; occasionally attacks of convulsions; mental deterioration; atrophy of the abdominal organs (splanchnomikre) instead of (splanchnomegaly) as seen in acromegaly.

The cases are nearly always eventually fatal.

With the low basal metabolic rate thyroid preparations should be tried. Reye claims to have secured clinical improvement following the use of an anterior lobe extract called "praephyson," a German commercial product. Calder thought he obtained beneficial results from "antuitrin."

(V) *Cushing's Disease or Pituitary Basophilism.*—In 1932 Harvey Cushing[5] reported 12 cases in which he believed he had discovered a new symptom complex and he was of the opinion that it was due to the effects of a basophilic adenoma of the adenohypophysis. One of these was his own case; the others had been reported in the literature because of their interesting clinical features, but not as cases of pituitary basophilism, for nothing was known concerning this symptom-complex until Cushing drew attention to it. He obtained portions of the hypophysis from the physicians who had secured autopsies on some of the cases, and, by proper staining, found that the tumors in the adenohypophysis were actually basophilic adenomata.

The main features of the disease are as follows:

(1) Rapidly acquired, usually painful adiposity confined to the face and trunk and not involving the extremities.

(2) Purplish lineae atrophicae on the abdomen.

(3) Hypertrichosis of the face and trunk in females and pre-adolescent males and possibly the reverse in adult males.

(4) Amenorrhea in females; impotence in males.

(5) Dusky, plethoric appearance of the skin of the face and trunk.

(6) Moderate erythremia.

(7) Usually marked hypertension.

(8) Hyperglycemia and glycosuria the rule.

(9) Purpuric areas not uncommon.

(10) Osteoporosis, particularly of the spine, often causing kyphosis.

(11) Variable headaches, abdominal pains, fatiguability and ultimately extreme weakness.

(12) Occurs in young adults usually, average duration five years.

Cushing's paper has created great interest and a number of similar cases have been reported in the literature. MacCallum, Futcher, Duff, and Ellsworth[6] have reported a fatal case in which there were strong evidences that the tumor originated in the pars intermedia. There has been considerable controversy as to whether the symptom-complex is actually due to a pituitary basophilism or whether it is due to disease of the adrenal cortex, as many maintain.

It is worthy of note also that Otto Leyton[7] has reported 3 cases showing Cushing's syndrome in which there was an "oat-celled" carcinoma of the thymus.

(VI) *Diabetes Insipidus.*—This disease was for some time considered to be due to disease of the neurohypophysis. The experimental work of Camus and Roussy, Bailey and Bremer, and others has shown that puncture of the hypothalamus, posterior to the infundibular stalk in the tuber cinerium region, will cause a transitory polyuria in animals. Greving and Pines believe that there is a water-regulating center near the floor of the third ventricle, called the nucleus supra-octicus or nucleus paraventricularis, and that lesions of this center result in the production of diabetes insipidus. The writer has reported a case of the disease in which there was a carcinomatous metastasis in the hypothalamus without any disease of the neurohypophysis. The consensus of opinion at the present time is that diabetes insipidus is primarily due to lesions that occur in the hypothalamus rather than being due to posterior pituitary disease, notwithstanding the beneficial effect that extracts of the posterior lobe have on the polyuria and polydipsia in many cases. It is believed by Sulzberger and Ferguson that the antidiuretic factor in the posterior lobe extract actually comes from the intermedin of the pars intermedia.

In the consideration of the functions of the hypophysis the most interesting feature would be a discussion of the interaction of its hormones with those of the other endocrine glands, but this would take us too far afield and time will not permit. In another paper in this Section, however, the relationship of the hypophysis and the thyroid is being dealt with.

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HUMAN STERILITY*

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The subject of human sterility is steadily attracting more and more medical and lay attention. Interest in sterility studies is naturally increasing in constant pace with the rapid and spectacular improvements in the results of the treatment of the condition.

In warrant of this statement it may be said at the outset of this paper that nearly 54 per cent of the instances of relative sterility in my series have proven correctable, pregnancies having occurred in this ratio. It is evident from this, therefore, that of all couples not having actual pathologic destruction of their generative organs, more than one in every two may be enabled by proper diagnosis and treatment to have the children they desire. Is it strange, since this has become true, that this subject now ranks as one of paramount importance to childless couples and their physicians? These present possibilities are of such recent development, and have been changing and improving so rapidly of late, that this subject seems timely for discussion.

The term relative sterility as used above is applied to those couples in whom pregnancy is not impossible, but is impeded or interfered with by various factors. This is to be contrasted with absolute sterility where anatomic or genetic faults or pathologic changes make pregnancy impossible for the time being.[1] It may be interpolated here that many instances of absolute sterility can now be corrected by operative measures, but this will be considered more fully in a later paragraph.

Primary sterility is the term applied by Meaker[2] to marriages from which no pregnancy has resulted, while sterility acquired after one or two pregnancies is designated by him as secondary sterility. These definitions should be kept in mind, but in this paper I shall refer almost entirely to relative and absolute sterility.

The treatment of human sterility is directly dependent upon the thoroughness with which

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every one of the many possible factors in each case is sought out and tabulated, all finally being added together by the physician searching for the cause of the sterility of any couple. There is always a multiplicity of factors, both female and male. In certain instances merely one or two of these may be of sufficient importance to cause sterility, but the usual finding is a group of several minor or relatively insignificant faults acting in conjunction with each other to make the couple sterile.

Treatment is usually correspondingly simple, and often spectacular in its effectiveness, when the various causes of the trouble have been discovered and systematically tabulated.

It is clear, therefore, that treatment of sterility must rest upon an accurate and painstaking search for and discovery of its several causes in each case. There is only one way by which this can be accomplished. The investigator must pursue, routinely in every instance, a series of identical steps in the study of each couple regardless of how much or how little he may discover as the investigation progresses. For example, the finding of obstructed tubes patent only to high pressures during insufflation does not eliminate the need for thoroughly studying the husband, or make it permissible to omit further study of the wife. Neither does it warrant the conclusion that this, being a highly potent cause, must needs be the sole cause.

DETERMINATION OF CAUSES

General.—It is useless to undertake a sterility study unless the husband and the wife both agree to cooperate without reservation. The analysis of possible male faults is quite as important as that of the female factors, and it is rare indeed not to find several defects on both sides. Consequently if the husband declines to participate in the investigation through some guilty doubt about his responsibility or an unjustified but not uncommon feeling of male superiority, the physician should decline to take the case. It is unfair to the wife and also to the physician and not worth while, under such circumstances, to make an incomplete and usually unsatisfactory study.

The essential steps in a sterility study have been outlined by me in a previous paper.[1] They may be reviewed as follows:

History.—The histories of the wife and of the husband are taken on separate, special record forms designed for this purpose.

It is important to know how long the couple has been married and how long contraceptives were used. A childless couple cannot reasonably be classed as sterile unless they have been endeavoring for at least one year to accomplish a pregnancy.

History of previous marriages by either wife or husband, and whether or not these were childless, is important, as is also a record of earlier pregnancies in any couple now having a so-called secondary sterility.

Without referring here to every detail of this special record form, it is clear that data concerning illnesses and operations on the wife are essential, while special information must be sought from the husband concerning venereal infections and mumps with orchitis.

The occurrence of menstrual irregularity in the wife suggests ovarian dysfunction with possible disturbance in ovulation, to be tested for more accurately by hormone estimations and a premenstrual endometrial biopsy which will be described presently.

The general history of both must be obtained in respect to possible deficiency in proteins and various vitamins in the diet, the excessive use of alcohol, the frequency of coitus, the use of lubricants which may have an unsuspected contraceptive effect, and the matter of whether coitus takes place most often before and after the menstrual periods or during the more favorable intermenstrual "ovulation period."

General Physical Examination.—These special record forms direct the physician in carrying out the general physical examination. Foci of infection must be sought out, structural or skeletal changes noted, and one must observe evidence of glandular disturbances such as localized or even general obesity and peculiar hair growth.

The blood pressure readings on both husband and wife, their blood counts, and urinalyses are likewise important. For example, especially low blood pressure may suggest deficient thyroid function or may result from anemia, either of which can be a strong factor in causing sterility.

Basal metabolism estimations for both must be arranged at as early a date as possible, and are particularly important.

Special Examinations.—The pelvic examination of the wife to rule out or to discover malformations, cervicitis, uterine displacements, incomplete development of the uterus, tumor growths or pelvic inflammatory masses, has its

corollary in the examination of the husband's genitalia.

The test for tubal patency by insufflation (Rubin test[3 4]) may be done at this same time of the routine pelvic examination, especially if the wife, in making her appointment, has been directed to come during the week or ten days following a menstrual period.

This test for tubal patency consists in the passage of carbon dioxide gas, in measured amounts and under measured pressure, through a sound into the uterine cavity, escaping into the peritoneal cavity through the fallopian tubes if these are open. The resistance of the tubes to this passage, measured on a mercury column, is the gauge of their patency. This varies from normal levels where the gas passes at about 80 mm. pressure, up to 210 or 220 mm., marking the limit of safety in pressure and indicating presumably occluded tubes. Resistance followed by passage at points between these levels marks relative or partial degrees of obstruction, and in these the test is frequently of therapeutic value through stretching or opening the tubes. The gas should be injected slowly in order to avoid causing tubal spasm and a false impression from this that they are closed.

Complete occlusion, or even resistance up to the higher levels, as well as small tumors, warrant intra-uterine injection of an opaque medium for x-ray visualization. Suspected malformations such as uterine septa may likewise be demonstrated thus.

A definite technic should be followed for this, for two reasons. The first of these is that iodized oil which slowly liberates free iodine is not infrequently irritating to the tubal mucosa and the pelvic peritoneum. This is especially true if there has been any previous inflammatory condition and, in a limited but distressing number of such cases, the injection may precipitate a chemical salpingitis or a parametritis or similar acute inflammatory reaction. On this account, an effort has been made[5] to develop a non-irritating solution, not of iodine in oil, but of iodomethane sulphonate (skiodan) in water with a bland vehicle (acacia) having sufficient viscosity to cause it to adhere to the surfaces as does the more irritating iodized oil. This is at present in the process of development, but sufficient trial has been possible in our clinic to demonstrate its efficacy.

The second point of importance is that the technic of Hyams[6] should be followed in making these injections. He has suggested that instead of filling the uterine cavity to capacity (usually about 10 c. c.) with the first injection, serial injections of two cubic centimeters each be made with an x-ray picture taken after each of these. Five or six such pictures make the usual series. When these are compared with each other in sequence, filling defects from small tumors, septa, or other malformations are made much more clearly apparent, while the advance of the opaque fluid up through the uterine cavity, along the tubes and out their ends, or to their points of blockage, as the case may be, become vividly demonstrable by this technic. Partial obstructions can be seen and the exact site of obstructions noted.

For all special examinations of the husband it is strongly advisable to have the close cooperation of a urologist actively interested in this particular work. He is much more competent than the gynecologist to discover developmental anomalies in the male, such as hypospadias or epispadias, or to judge the normalcy of the testicles and the condition of the prostate gland.

The proper examination of the spermatic fluid is so important, and in general has been so grossly neglected by many physicians undertaking these studies, that I desire to give special attention to this feature of this work.

It has been far too general a custom among physicians investigating instances of sterility to exonerate the husband from responsibility on the mere observation of motile spermatozoa. Usually the procedure is to ask the husband to provide a condom specimen, or one performs the Huhner[7] test. This latter is the recovery of spermatic fluid from the cervix of the wife at a postcoital examination. The fluid is then examined by microscope, and as mentioned above, if moving spermatozoa are seen the husband is likely to be told that he is entirely fertile and that there is no fault or responsibility on his side, attention then being centered on the wife. The fallacy and incorrectness of this in many instances cannot be too strongly emphasized.

The mere fact that moving spermatozoa are seen does not give assurance of male fertility, and none should make this common mistake. This is comparable to an attempt to diagnose anemia merely by a hemoglobin estimation, without a blood cell count or a differential study of the types of corpuscles. Moreover, it is also a fact that finding all or practically all of the sperms in a specimen dead or only feebly motile

does not prove that this man is hopelessly or permanently sterile, because many of these cases are correctable by simple treatment.

The proper examination and evaluation of spermatic fluid for male fertility involves several essential points.

The first of these is in the method of collection of the specimen. The ejaculate should be gathered directly into a clean glass beaker, or else may be collected in a condom, which must be emptied immediately into a clean glass bottle. The sheath should be washed beforehand to free it from particles of talcum, and must be emptied at once, because if left in contact certain chemicals in the rubber may kill the spermatozoa and thus cause a wrong interpretation of the specimen, according to Cary. The glass bottle should not be heated because accidental overheating would likewise kill the cells; moreover, normal spermatozoa are able to remain active at average room temperature for many hours (8 to 24 or 36 or more hours). The specimen is transported to the laboratory in an inside pocket near one's body to avoid possible chilling, especially in cold weather.

Further essential points are to be observed in the details of the examination. The amount of the ejaculate is measured, the normal for this being 2.5 to 5 c. c. Its viscosity is adjudged, and while normally high the tenacity of the fluid should not be too great nor should there be solid clumps of mucus. Investigations in our laboratory by Messer and Almquest[8] show that hydrogen-ion estimations are relatively unimportant, although this is contrary to the usual belief. The fluid is normally alkaline.

The next step is to prepare a fresh, wet specimen for microscopic examination and for timing the duration of motility of the spermatozoa. The four edges of a cover glass are smeared lightly with vaseline, a large drop of the fluid is placed on a glass slide and covered with this cover glass. The vaseline prevents evaporation and drying out of the specimen. This specimen is examined under low power and then by high power magnification. In a general way, one estimates the numbers of the spermatozoa present, their activity and the vigor of their movements, and the approximate percentage of dead among the living cells. Abnormal forms may also be noted, and the nature of their movements or their lack of motility observed. Foreign constituents, such as excessive mucus and pus cells, are also observed.

The spermatic cell count is made in an ordinary blood counting chamber, the technic[9] having been modified in our laboratory by McClellan from that described by Meaker.[2]

The average normal number of spermatozoa is 100,000,000 to 150,000,000 per cubic centimeter. Numbers ranging downward from this indicate, with certain reservations to this statement, a corresponding lowering of fertility. In this connection it must not be forgotten that lowered numbers per cubic centimeter may result temporarily from too recent or too frequent coitus prior to this examination. Moreover, a low count per cubic centimeter in an ejaculate of large volume may contain a total number of spermatozoa available for invasion of the uterus and tubes and for fertilization of the ovum, considerably greater than that total when there is a much higher count per cubic centimeter, but the specimen is of smaller volume.[10]

Another slide is prepared for staining in order to make a differential count of the cells (see reference 9 for technic). Practically all specimens show some abnormal forms, but the maximum limit for fertility is probably about 25 to 30 per cent. Greater numbers than these rank this individual as relatively infertile, even though motility of all of the cells, both normal and abnormal, may be good. Holt,[11] who has studied this subject exhaustively in collaboration with Moench, tells me that she has never seen a pregnancy result when the abnormal forms of spermatozoa were more than 30 per cent of the total. Nevertheless, these percentages vary spontaneously from time to time in the same individual.

It is in cases where the percentage of abnormal forms is high that mere motility is deceptive and misleading. Spermatozoa with bent heads or necks, or coiled tails, or extrusion of the cytoplasm of their necks, may move actively but still be incapable of fertilizing an ovum, or at least of producing anything better than a monstrosity which will usually be aborted early in the pregnancy.

To recapitulate, therefore, a specimen of spermatic fluid actively capable of fertilization should have a thinly viscid consistency, an alkaline reaction, a volume of two or more cubic centimeters, 100,000,000 to 150,000,000 spermatozoa per cubic centimeter, of which at least 65 to 75 per cent should be actively motile, while not more than 20 to 25 per cent of these cells may show abnormal morphology. Their duration of motility should be eight or more hours.

The amazing thing is that the foregoing is true even though only one spermatozoon of all this multitude is needed to fertilize an ovum. Nevertheless this is so, and probably the explanation lies in the presumption that the mass vigor, and normalcy, and fertility of the multitude are correspondingly reflected to some degree in each individual cell.

Defective specimens are frequently found to be associated with pronouncedly lowered basal metabolic rates. Foci of infection such as teeth or tonsils, with or without anemia, may be indirectly associated, and may even be more directly related by being the source of low grade prostatic infections. The prostate in these cases is usually found enlarged and softened.

Men having specimens with deficient total cell count, or abnormally diminished activity of the cells, or even with only dead spermatozoa, must not be pronounced hopelessly sterile. The majority of these conditions can be corrected by the administration of thyroid substance when indicated or even empirically, with the addition of a course of hypodermic administration of gonadotropic hormone and prostatic massage. Such individuals should avoid suspensory straps or too warm clothing around the genitalia, because undue warmth interferes with spermatogenetic function of the testicles. Increase in protein ingestion, and avoidance of too frequent intercourse are helpful. More frequent coitus about the probable time of ovulation (eleventh to eighteenth days of the menstrual cycle) and its avoidance shortly before or after the menstrual periods increases the likelihood of pregnancy as the man's potency improves.

Total absence of spermatozoa in several ejaculates offers an unfavorable outlook. When this has resulted from mumps followed by orchitis, or from undescended testicles, the man is probably permanently sterile. When it follows obstruction of the vas deferens from epididymitis following gonorrhea, this does not mean that the testicles are not producing spermatozoa, but that their escape is being prevented. Hagner[12] has described an operation for a "short-circuit" anastomosis which allows their evacuation and in a fair percentage of instances restores fertility.

Other causes may prevent the appearance of spermatozoa in the specimen. So simple a one as a urethral stricture may act by causing the ejaculate to be passed upward into the urinary bladder instead of outward along the urethra as is normal.

It is apparent, therefore, that one's prognosis in all of these apparently unfavorable cases should be extremely cautious and guarded. Conditions may fluctuate and change spontaneously for the better, or apparently hopeless conditions may actually be correctable either by therapeutic or by surgical measures.

The matters of male responsibility have been discussed in considerable detail because so much confusion and misunderstanding have existed about them and still prevail. With a better understanding of these factors it is certain that an even higher incidence of success in the treatment of sterility may be expected. For further emphasis certain of these details will be repeated briefly under the subject of treatment.

SUMMATION OF CAUSES AND TREATMENT

When the study of a sterile couple has been completed, a summary of all possible faulty factors should be made for the purpose of attacking each by appropriate treatment.

Female Factors.—Female faults, excluding actual anatomic abnormalities, may be one or several of the following:

(1) *General Faults.*—These include anemia, debilitating diseases, foci of infection, chronic intoxications and dietetic deficiencies or overindulgencies, and should be treated appropriately.

(2) *Vaginitis from Trichomonas or Monilia Infection.*—The treatment is fairly specific for each of these, certain arsenical preparations or picric acid being used for the former, and gentian violet applications for the latter. Details need not be submitted here.

(3) *Cervicitis.*—A heavy, sticky plug of mucus usually fills and obstructs the cervical canal affected by this condition. This may be aspirated by a strong suction syringe, and the canal dilated at intervals as suggested below for cervical atresia. Granulating cervicitis, if not wide, is treated by radial striping with a fine edged cautery. Deep and wide granulating areas of cervicitis should be removed by conization with the electrosurgical cutting loop according to the technic of Hyams.[13] Local anesthesia by means of procaine hydrochloride is necessary for this.

(4) *Atresia of Cervical Canal.*—This may be primary, but is often secondary to deep curettage or too heavy cauterization. Even a moderate degree of atresia is usually accompanied by a tenacious mucous plug in the cervical canal. Dilatation by graduated sounds and aspiration

of the mucus is appropriate treatment. It is necessary to repeat this at intervals, preferably following menstrual periods.

(5) *Retrodisplacements of the Uterus.*—These cause a chronic passive congestion of the cervix with cervicitis, as well as engorgement of the body of the uterus and the endometrium. The fallopian tubes are usually moderately obstructed as a result of this swelling. Manual replacement of the uterus and its support by means of a pessary are indicated.

(6) *Obstruction of Fallopian Tubes.*—Tubal obstruction is detected, as was described above, by peruterine insufflation with carbon dioxide gas (Rubin test). When the obstruction is only partial or relative, as contrasted with actual occlusion of the tubes, this test often proves to be highly effective treatment, since it dilates and stretches the narrowed lumen of each tube. Pregnancy may follow, especially if this gentle dilatation is repeated after each of several successive menstrual periods. Presently, it will be found that the pressures required become lower and lower until more nearly normal or average levels are reached.

(7) *Tumors.*— Tumors, including fibromyomas and ovarian cysts, interfere seriously with conception and on this account, if for no other reason, should be removed.

(8) *Endocrine Dysfunctions.*—Glandular disturbances may be several, and are detectable in different ways. Almost always they have a functional interrelationship with each other. Pituitary gland disturbances are marked by peculiarities of hair growth and of fat distribution, as well as by skeletal structure changes. Pituitary and ovarian disturbances may be partly evaluated by certain estimations of their hormones in the blood[14] and urine.[15]

Ovarian dysfunction is suggested by menstrual irregularities. A small amount of tissue, which may be removed painlessly from the lower portion of the uterine cavity by means of the Novak suction curette,[16] gives fairly accurate information regarding ovulation. This must be taken immediately prior to a menstrual period, in order to determine microscopically whether or not the usual premenstrual endometrial changes are present. When these are found, this indicates that an egg has been extruded and the corpus luteum has formed in the ovary, as it is this latter which influences the formation of these characteristic endometrial changes.

Hypothyroidism, as shown by lowered basal metabolism readings and the usual clinical symptoms, has a powerful effect on ovarian function, ovulation, and menstruation. The administration of thyroid substance is clearly indicated and is often followed by regulation of the menstrual cycles and by pregnancy.

Gonadotropic hormone may be administered for the related pituitary and ovarian dysfunctions. This is the anterior pituitary-like hormone extracted from the urine of pregnant women. It should be given in doses of 200 rat units three times weekly or 500 rat units twice weekly by hypodermic injection, being given five days after cessation of the menstrual period and continued for the ensuing two weeks. Many preparations of gonadotropic hormone are now on the market. The one I prefer is the dry powder or crystalline form ("antophysin") from which fresh solutions are prepared by dissolving in distilled water immediately before using. My preference for this is due to the fact that solutions, even when dated, seem to deteriorate and lose potency after varying intervals of time. This is especially important, also, in connection with the use of this hormone in stimulating spermatogenetic function in the male, as described below.

Stimulating dosage of x-ray to the pituitary, thyroid, and ovarian regions is frequently highly effective in restoring a patient's ability to manufacture her own hormones.[17] I have had several cases where such deficiencies were an outstanding feature of the sterility, and where pregnancy followed promptly after such treatment.

One gives 10 to 12 per cent of an erythema dose to the ovarian and thyroid regions and 15 per cent to the pituitary region. This entire dose is usually divided into fourths and given at weekly intervals for four doses, but it may be given in one treatment if necessary.

Male Factors.—(1) General faults, such as foci of infection, including teeth, tonsils, and prostate gland, chronic intoxications as from excessive use of alcohol or poisoning by lead, anemia, fatigue from overwork, too frequent coitus, dietetic and vitamin deficiencies, and similar conditions play a powerful role in the spermatogenetic function of the male. The correction of each of these must be insisted upon, especially if the examination of the spermatic fluid shows evidence of trouble. A certain amount of outdoor exercise is valuable, as is also avoidance of mental and physical fatigue.

(2) *Local Faults.*—The urologic examination

should disclose any anatomic abnormalities such as epispadias or hypospadias, undescended testicles, or insufficient development of the penis. The testicles should be firm, rather than soft. Suspensories are especially undesirable for these men because they overheat the testicles. The prostate gland should be smooth and firm instead of enlarged, softened and irregular as is the case when it is the site of a chronic infection of any type. A regular course of prostatic massage is indicated when this latter condition is found.

Urethral strictures, when suspected, should be sought for and treated.

(3) *Hypothyroidism.*—Lowered thyroid activity, with low basal metabolic rates, is especially common in business and professional men, and may or may not be accompanied by some degree of obesity and chronic fatigue. Normal thyroid activity has an important influence on spermatogenesis, and a lower than normal thyroid function must be corrected by the administration of adequate amounts of thyroid substance. Even with the finding of an apparently normal basal metabolic rate, clinical symptoms of lowered thyroid activity warrant the giving of thyroid substance.

(4) *Deficient Spermatogenesis.* — The complete examination of the spermatic fluid has been described above, and important deficiencies are far more common than is generally appreciated.

Correction of the general faults mentioned in paragraph one of this section, the treatment outlined in paragraph two for chronic prostatic infections, the administration of sufficient thyroid substance over fairly long periods of time whenever indicated or even empirically, are of the greatest importance in overcoming faulty spermatogenesis, with insufficient numbers, or diminished motility, or too high a percentage of abnormal forms of spermatozoa.

In addition, the administration and occasional readministration, in courses, of gonadotropic hormone or the anterior pituitary-like hormone derived from the urine of pregnant women often has a striking effect. As mentioned above, the powdered or crystalline form of this, dissolved in distilled water immediately before injection, is recommended. Five hundred rat units should be given twice weekly for a series of fifteen injections. Smaller doses, such as 200 rat units, may be given more often (three times weekly for 20 doses) if convenient to do so.

Occasional examinations of the spermatic fluid will disclose the effects of these several approaches to treatment, and one must be exceedingly careful to avoid overstimulation.

GENERAL

This discussion of the search for and the treatment of the many associated causes of relative sterility in the human may seem to be so complicated as to be impractical and discouraging to the average physician meeting such cases.

If one follows a definite routine in each case, such as that outlined in the history cards, and then carefully summarizes and treats all faults found, whether these be trifling or important, the entire matter becomes greatly simplified and excellent results will follow. My first series of cases was reported[1] six months after the last registration in the series. During the ensuing six months additional patients listed in this group became pregnant. Now, in this series of sixty-seven cases of relative sterility reviewed twelve months after the last registration, thirty-six pregnancies are recorded, making an incidence of 53.7 per cent. The duration of sterility among these patients ranges from a minimum of one year to a maximum of fourteen years. I now have a new group of seventy-six additional cases in which a number of pregnancies have occurred, but many of these patients are recent registrations still being studied or treated, and must therefore be reported subsequently rather than at present.

As mentioned before, the best results are obtained when a small group of physicians work together, headed by a gynecologist and a urologist. This is no reason why any physician who is genuinely interested should not undertake this work. If he does, however, it is distinctly indiscreet on his part, as well as unfair to his patient, to go through only part of these studies or to disregard minor faults, and then to tell his patients that everything possible has been done and nothing more can be accomplished. The physician who does this may be highly embarrassed when subsequent studies and treatment elsewhere produce results, or a couple whose sterility could be corrected may be unwarrantably discouraged by his verdict.

Particular emphasis should be laid again upon the studies of the male and their interpretation. A man who has motile spermatozoa is not necessarily fertile, nor is every male with inactive spermatozoa hopelessly sterile. These points must not be forgotten in the management of these cases.

ABSOLUTE STERILITY

The subject of absolute sterility deserves mention and some consideration in this discussion, in order that those interested may be at least familiar with the possibilities for its successful treatment or correction.

It will be recalled that absolute sterility was defined as a state in which anatomic or genetic faults or pathologic changes make pregnancy impossible for the time being. Certain of these conditions are correctable.

Common examples of absolute sterility in the female are instances of infantile uteri, absence of artesia of the vagina with or without the uterus being involved, occlusion of the fallopian tubes as from gonorrheal salpingitis, adhesions of the tubes from parametritis or other pelvic infections and from endometriosis.

In the male, gonorrheal occlusions of the epididymis or the vas deferens, and urethral stricture, as well as orchitis following mumps, are common causes of absolute sterility. Cryptorchidism with atrophy of the testicles is another but less frequent cause.

Almquest, the urologist of our group, and I formerly included in the group classed as absolutely sterile all of those males in whom we found gross deficiencies in the spermatic fluid, such as notably low numbers of spermatozoa with little or no activity. At present, however, we find that so many of these conditions are readily corrected that we now class as absolutely sterile only those males whose spermatic fluid, repeatedly examined, shows no spermatozoa at all. Our percentage of pregnancies to be reported in the future following treatment of sterile couples will probably suffer from this rigid rule, but we have ample reason for it.

When such a male is encountered, a search is made for the cause of his azoospermia. If it is the result of failure of descent of both testicles with their atrophy as the individual grew to adult life, or the result of orchitis following mumps, treatment is unavailing and an unfavorable prognosis should be given. Let this be guarded, nevertheless, because a wrong diagnosis or the consequences of a "love triangle" may require embarrassing explanations from the too positive physician.

Urethral strictures, causing the ejaculate to pass upward into the bladder, should be incised or dilated by a competent urologist.

Gonorrheal occlusion of the epididymis may be corrected by the anastomosis of the vas described by Hagner[12] and mentioned above.

In the female, gross developmental anatomic defects offer a hopeless outlook. Gonorrheal or other occlusion of tubes, however, may be successfully overcome by certain plastic operations. These include freeing of adhesions and suspension of the tubes and ovaries, the "circumcision-cuff" operation to relieve occlusion of the fimbriated end of the tube ("clubbed tubes"), implantation into the uterus of tubes occluded at their interstitial portion following excision of the strictured end, or even implantation of a segment of ovary into the uterine wall when the tubes are entirely occluded or have been removed. Holden and Sovak[18] have devised much of the technic for this tubal work, and it has been subsequently redescribed by me.[9] Estes and Heitmeyer[19] have reported the largest series of ovarian implantations on record.

Obviously, the decision to undertake such operations as these is largely dependent upon the diagnostic results of the injection of the uterus and tubes with an iodide for the purpose of x-ray visualization of these cavities. This is especially important, because the best results are obtained (pregnancy in approximately one-third of cases) in those patients having merely "clubbed tubes," the second best results in those needing implantation of the tubes, and the poorest in those whose tubes are entirely lacking and the ovary must be implanted into the uterine wall.

The patient and her husband should be told frankly of the limited possibilities to be expected from such operations, and not be unduly urged to undergo one of them. Nevertheless, that one particularly designed for correction of occlusion at the outer end of the tubes, where x-ray visualization has demonstrated that the remainder of the lumen is open, may be recommended with considerable assurance.

It should be obvious, before undertaking any operation on either the wife or the husband, solely for relief of sterility, that the other partner must have been thoroughly studied and found to be apparently fertile.

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DISEASES OF THE ESOPHAGUS FROM THE VIEWPOINT OF THE INTERNIST*

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Internists have, for very good reasons, turned over to the roentgenologist and the endoscopist the final steps in diagnosis and much of the treatment of most of the disorders of the esophagus. This is a great advance since the days of the blind passage of the dangerous bougie, but, unfortunately, although quite understandably, the internist seems to be in danger of forgetting that the esophagus exists and that the primary responsibility for the diagnosis of its diseases still belongs to the internist. It is his duty to suspect the possibility of esophageal disease and to call into action the specialized methods of diagnosis and treatment which will not otherwise be made available to the patient.

It is true that the incidence of diseases of this forgotten organ is usually given as less than 1 per cent of general hospital admissions, but I believe that many cases go undiagnosed and that many symptoms of esophageal origin are not recognized as such. Too many of us think of dysphagia as the only symptom of esophageal disease, and of carcinoma as the commonest pathological process. We forget that there are many other disorders of the esophagus, including congenital and acquired deformities, inflammations and disturbances on a purely functional basis. We overlook the fact that symptoms other than dysphagia do occur from esophageal disease and that dysphagia is not by any means always present.

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These facts are not new and may be known to all of you, but they were brought home to me very strongly when I recently reviewed the records of my patients whose final diagnosis was that of esophageal disease. Let me briefly tell you of a few of these.

Case 1.—Twelve years ago a woman 49 years of age came complaining of pain and tenderness localized to a point in the fourth interspace between the right breast and the sternum. This she believed was a sign of carcinoma of the breast, a disease which had recently killed a close friend. She was worried, apprehensive and had lost eight pounds in weight. The rest of the history, the physical examination and routine laboratory studies were all negative. In order to relieve the patient's cancerphobia an x-ray of the gastro-intestinal tract was made and was negative except that the opaque capsule hesitated in the esophagus at about the level of the painful area. Fluids passed readily and washed down the capsule. However, on esophagoscopy, Dr. Chevalier Jackson found at the exact level of the pain a spasmodic narrowing and "a chronic inflammatory condition of the mucosa with patches of bleeding epithelial erosion."

Reassurance, careful eating, antispasmodics and bismuth after food gave prompt relief; the pain disappeared, the capsule passed freely and weight returned to normal. During the subsequent twelve years no malignant disease has developed, but whenever the stress of life has become too great the same pain has returned. Only recently, at the age of 61, she has the same pain as a result of her 70-year-old husband's marital infidelities.

This case illustrates several points worthy of note. First, the location of the referred pain, anterior, along the side of the sternum, and at the level of the esophageal lesion, and secondly the occurrence of pain of esophageal origin without any subjective dysphagia, for no dysphagia has at any time been present in this patient. This location of referred esophageal pain is misleading and when on the left side is often mistaken for pain of cardiac origin.

The functional disorder of the esophagus which caused this patient's pain is not rare. We do not know why in one person an increase of nervous tension will cause globus hystericus, in another cardiospasm and in still others pylorospasm, spasm of the colon, or spasm of the esophagus. We know only too well how common is such a "break in the kinetic melody," as Houston[1] calls it. We know how subject the whole digestive tube is to the influence of the autonomic nervous system, and this is just as true of the esophagus as of any other portion of the tract.

Sometimes the source of the spasm is wholly psychic; sometimes it arises from irritation by a neighboring neoplasm or a diseased gallbladder. Whatever its source or its position, the spasm is

the same and if continued sufficiently long may lead to inflammation, ulceration, stricture and obstruction.

Case 2.—In 1935, a 63-year-old woman was referred to me complaining of fatigue, discomfort under the lower third of the sternum and pain between the sternum and the right breast going through to the back. She had lost forty pounds, but this was blamed on a coincident diabetes. The only other symptom was a sensation that fruits and sweets sometimes seemed to stick on swallowing with increase of pain, but meat and other foods in even larger pieces passed readily.

Her father had died of esophageal cancer, so she feared this and had had two swallowing function studies within four months, both of which were normal. At the University Hospital, this test at first revealed a slight delay near the cardia which on repetition disappeared. By x-ray two large gallstones were found. I unfortunately concluded that the cholelithiasis was the source of all her symptoms, some arising in the gallbladder itself and some from a reflex cardiospasm. Cholecystectomy was successfully performed.

Five months later she returned, stating that she had been relieved for a short time after the operation, but following a death in her family the pain returned and the dysphagia for grapefruit and other fruits was more marked. This picture again suggested spasm of nervous origin, but the x-ray now revealed a large eroded area at the lower end of the esophagus and esophagoscopy and biopsy proved that the lesion was carcinoma.

In retrospect, there is no doubt in my mind that the lesion was already making its presence felt at the time of the first admission, in spite of the bizarre character of the dysphagia and the reasonable probability that all the symptoms could be explained by the calculus disease of the gallbladder. The responsibility for the futile operation rests on the internist and on the roentgenologist who, after being suspicious of the first study of the esophagus, was lulled into giving a report of normal when the area seemed to fill out in the second. Of course, our mistake made no difference in the outcome, for cancer of the esophagus is an almost hopeless disease whether one turns to the serious dangers of operation or trusts to radiation.

The lesson taught by this case is obvious. We were too ready to believe that the gallstones were responsible for the symptoms, although we all of us know how often gallstones are present for years without producing symptoms. Also we were too quick in assuming that the little evidence pointing to disturbance of the esophagus was due to functional disturbance of the cardiac sphincter, although no doubt there was a big element of nervous origin in the superadded spasm.

Case 3.—A man 41 years of age was referred to me by Dr. B. B. G. Blackstone, of Wilmington, Delaware, a few years ago in a state which for brevity we may term "nervous prostration." He attributed all his nervous troubles to a long-standing discomfort or pain just to the right of the sternum in the fourth interspace.

He had first noticed this sensation at the age of 22, when he was extremely healthy and athletic. At first it was merely a tickling sensation and was noticed chiefly after long exercise. He was examined and no explanation for the symptom found. The sensation persisted and increased and when he was 27 he was again thoroughly studied and no explanation found.

By his 29th year the sensation had become definite enough to warrant the term "pain" and had become very annoying; by his 36th year the pain extended to the back and it began to upset him nervously. He had a nervous breakdown and even a six weeks' rest cure, some psychiatric treatment and osteopathic treatment did not restore his control. He continued to be extremely nervous and finally went to pieces nervously, entered a hospital and was again thoroughly studied without the finding of anything abnormal.

At the age of 41 he came to me begging for a complete restudy, for the pain made life intolerable not by its severity, but by its constancy and mystery. It was sharply localized at the junction of the fifth rib on the right with the sternum; posteriorly there was tenderness from the fifth thoracic spinous process to the vertebral border of the right scapula.

In view of all the previous negative examinations and my suspicion of the esophagus, we proceeded at once to a study of the swallowing function. The opaque capsule lodged in the upper third of the esophagus just where the esophagus is crossed by the left bronchus. Esophagoscopy was now for the first time performed and it was at once observed that the upper cervical esophagus was narrowed, even a 7 mm. instrument being introduced with some difficulty. At the second esophagoscopy, in the hope of learning more of the lesion which we now felt must be the cause of his troubles, the upper cervical esophagus was found very inflammatory; the mucosa was swollen, edematous and eroded. No tissue was removed.

Tragedy now took the stage. The fever rose, the patient became very ill, and it became obvious that infection was spreading through the mediastinum. Death occurred four days later.

At autopsy, between the cervical esophagus and vertebral column there was found an old thick-walled abscess adherent to both esophagus and vertebral body, from which infection had very recently spread out along the various fascial planes with extensive mediastinal infection and death.

The origin of the old abscess could not be determined. It might have followed an undiagnosed retropharyngeal infection in childhood or a perforation of the posterior wall of the esophagus as by a fish bone; it might have been a sequel of his earlier typhoid fever, but there was no evidence of disease of the vertebra at that point nor were typhoid bacilli recovered. Certainly the lesion was old; undoubtedly it had explained his pain which in turn had upset his nervous equilibrium.

It is interesting that such a small mass as the abscess formed was sufficient to narrow the lumen of the esophagus. This was no doubt due to the fact that the abscess fixed the esophageal

wall to the spine, whereas even very large masses in the mediastinum may cause no esophageal narrowing, for the esophagus is free enough to slip away from the pressure of such masses unless it becomes adherent.

The other important feature of the case is the unfortunate result of the esophagoscopy. No criticism can be directed at the decision to carry out this investigation nor as to the technic of its performance. It is the internist who must bear the responsibility; it is he who should determine whether an aneurysm, for example, is present and might rupture under little pressure; and it is the responsibility of the internist to warn the endoscopist if the unexpected is likely to be encountered.

This is the only fatality from esophagoscopy that I have seen. Since June, 1930, Dr. Gabriel Tucker, at the Hospital of the University of Pennsylvania, has performed esophagoscopy over 1,100 times without fatality and with only two instances of serious complication, one in an emergency esophagoscopy on an unsuspected case of diverticulum and the other in a patient who struggled on the table and injured the wall of the esophagus against the unusually sharp lip of the cervical vertebra. This possibility is now guarded against by careful preoperative x-ray examination. Esophagoscopy in skilled hands is safe and very often of the utmost value, but it must always be combined with proper study by the internist and by the roentgenologist.

Still other cases of esophageal disease demand mention.

Case 4.—One of the mathematical staff of the University came to my office saying that a month previously he had been acutely ill for ten days with fever up to 101° and pain in the neck, shoulders and arms and marked pain on swallowing, although there was no demonstrable sore throat. The fever and pains had ceased before any diagnosis could be made, but the patient was still very weak. Examination was entirely negative, but the routine blood count revealed 12 per cent of eosinophils. A check-up on the other members of his family led to a clear history of the eating of poorly cooked pork sausage and the occurrence of characteristic but mild symptoms of trichiniasis in his wife and sister-in-law which had led both to visit an ophthalmologist because of swelling about the eyes and supposed conjunctivitis. The wife was found to have 22 per cent of eosinophils.

In this instance the pain on swallowing arose in the muscles of deglutition rather than in the esophagus itself, just as the dysphagia of bulbar paralysis is due to weakness of these muscles. We must remember that dysphagia may be due to a great variety of troubles other than mechanical obstruction of the esophagus. One finds in the list of causes of dysphagia such widely dissimilar conditions as hydrophobia, myasthenia gravis and esophageal diverticula. Dysphagia is a symptom of many origins and must be interpreted in every case and must not be allowed to suggest but one diagnosis.

The dysphagia which forms one feature of the so-called Plummer-Vinson syndrome is a good example of this. Usually affecting middle-aged women the combination of severe anemia, loss of weight and dysphagia are apt to make one suspect an esophageal carcinoma, but the peculiar smooth glossy tongue and the prompt response to large doses of iron and vitamins make the diagnosis clear.

Similarly, I have seen dysphagia result from enormous venous varices in the veins in the lower part of the esophagus in a patient with advanced atrophic cirrhosis of the liver and in this instance the dysphagia, loss of weight, ascites and jaundice might easily have started one's thoughts in other directions.

Esophageal diverticula are very important and interesting and are very frequently overlooked, especially in the elderly, in whom pressure diverticula occur very insidiously, either at the point where the esophagus is narrowed as it is crossed by the left bronchus or higher where the esophagus and pharynx join. Dysphagia is a common symptom, but it differs in one important respect from the difficulty in swallowing from other causes. In the case with a diverticulum the dysphagia is apt to be intermittent, changing markedly from day to day perhaps as a result of the degree of fullness of the sac. Of course, the characteristic regurgitation of undigested food and mucus containing no acid often helps make this diagnosis. But in other cases the condition is for a long time unrecognized.

At the Hospital of the University of Pennsylvania, the X-Ray Department has for some time made it a rule to observe the swallowing function in all patients sent to them for study of the lungs and heart. Within this year Dr. Pendergrass studied three patients referred with a diagnosis of bronchial asthma in whose lungs there was found a basal inflammatory lesion which in turn was found to be secondary to overflow from a totally unsuspected esophageal diverticulum. In two other patients it was a disturbance of the swallowing function as seen under the fluoroscope which gave the only x-ray evidence of early mediastinal tumors.

It would seem, therefore, that such routine testing of the swallowing function is well worth while, for it is easily and quickly performed. One minor point must be remembered, that in the elderly the act of deglutition is apt to be distinctly slowed and a little delay is seen at the pharyngo-esophageal junction. This is physiologic in the old and should not be interpreted as a pathologic finding.

If we wish to go further in the list of disorders of the esophagus we will find that we are far from having mentioned all the disorders of this organ. Strictures may be congenital or secondary to ulcers, usually of a syphilitic nature, or to the ingestion of some corrosive substance; especially common in young children after the swallowing of lye.

Above a stricture the esophagus may dilate to an amazing degree; for example, in a recent report[2] in the *Canadian Medical Journal* the dilated esophagus had the enormous capacity of one imperial gallon. Even above a spasmodic stricture considerable dilatation may occur as, for example, that above cardiospasm; this disease which has had its name changed first to phrenospasm, then preventriculosis and now to achalasia by Hurst, of London. It is a very common condition and only too often gives symptoms which are mistaken for troubles in the stomach, duodenum or gallbladder as in the second case I mentioned.

Cancer of the esophagus is unfortunately quite common, still almost inoperable, and incurable by radiation. The second case I presented illustrated some of the features of this disease which are unfortunately only too familiar to us all. It is important to emphasize again that there may be a superimposed spasm which may give intermittent symptoms of obstruction and may be relieved by treatment and thus mislead one into overlooking the growth itself.

Still another important disease of the esophagus is that due to congenital shortening of the tube or as it is termed a thoracic stomach. In this condition the gastric mucosa extends above the diaphragm to compensate for the lack of length of the esophagus. Peptic ulcer may develop in the thoracic stomach and the symptomatology may be quite confusing and is apt to lead to a suspicion of some trouble below the diaphragm unless the clinician is very much on the alert or a routine swallowing function study is made. Symptoms may be present from birth, especially regurgitation, which may be so marked as to interfere with nutrition and growth. On the other hand, like many other congenital conditions, the symptoms may not appear until adult life. Often the chief symptom is severe substernal pain which may also be felt in the back. Of course, if ulceration and narrowing of the lumen occur there will be added more marked symptoms. (Several good reports on this condition have appeared in the current literature this year.[2 3])

We need scarcely do more than mention the rare occurrence of true esophagitis, which may at times simulate the picture of cancer, nor stop to discuss the rare neurosis, "rumination," which calls for a derangement of esophageal peristalsis, but is not truly a disorder of the esophagus. It is worth remembering that the presence of a foreign body in the esophagus may be overlooked, for there may be few symptoms or the symptoms when they occur may be misinterpreted.

We must stop this brief review of the diseases of the esophagus at this point, although it has not exhausted all the possibilities. It was not intended to do so, but rather to remind us that there are a number of different disorders of the esophagus and that these are frequently overlooked by the internist.

For the proper recognition of these troubles, it is necessary that the internist be alert to suspect the esophagus and prompt to proceed with appropriate measures for sure diagnosis.

The responsibility is still the internist's and success demands close cooperation between him, the roentgenologist and the specialist in esophagoscopy. All three must remember that the esophagus suffers from congenital anomalies and acquired deformities, from infections, neoplasms and disturbances of function of nervous origin; it may be the primary site of disease, but is often secondarily involved by disease of neighboring structures. Its disorders may appear at any age, insidiously or abruptly; its symptomatology is often misleading, even masquerading as an inflammatory process in the lungs. Only by familiarity with these facts, by routine suspicion of the esophagus on the part of the internist and routine examination of the esophagus by the roentgenologist, by prompt recourse to esophagoscopy and by good team work between the three can our duty to our patients best be performed.

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OCCUPATIONAL DERMATOSES*

THEIR MORE UNIFORM MANAGEMENT

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A disease which in one year in Ohio produces 2,000 cases with a total disability of 39,020 days lost, with an average medical cost of $30.00 and an average compensation cost of $100.00, ought to arouse considerable reaction.[1] If that same disease produces in Massachusetts[2] in a year 384 cases with 19,684 days' work lost because of disability, and if among government employes[3] produces over 1,000 cases with a total disability of more than 12,000 days' disability in one year, still more concern should be created. If we acknowledge that in all probability a considerable percentage of cases are not included in these figures from only two states and that 10 per cent of all skin disease develop an occupational factor upon careful investigation, we begin to have a concept of the importance of occupational dermatoses in causing disability.

These figures do not loom large in comparison with industrial accident figures, but at the same time they speak forcibly for the development of some program which will lessen their occurrence and decrease the disability thus produced.

There is at present much variation in the management of this group in the various states. Foerster,[4] in his recent Chairman's Address before the Section on Dermatology and Syphilology of the American Medical Association, has given us a very excellent summary of the existing legislation in this country. In only eight states is there a blanket provision providing for compensation for disability due to skin disease as well as other occupational diseases. Other states provide for various schedules: Ohio, including twenty-one occupational diseases, Minnesota twenty-two, with other states showing fewer conditions which are compensable. According to Sulzberger,[5] there are only eleven states which legally provide compensation for skin diseases. The Federal law providing for disability or death of an employe resulting from a personal injury while in the performance of his duty defines injury as any disease proximately caused by the employment, in addition to injury by accident.[6]

It is to be regretted that there is so much divergence in the methods of handling such cases in the different states. In only eight states have state departments of health any supervision over industrial accidents and disease. This seems hardly reasonable because one of the prime functions of such departments of health is in the detection and control of disease. The Public Health Service has endeavored to improve such conditions by aiding in the establishment of departments of industrial hygiene and the creation of the office of Dermatoses Investigations. With the object of making a more systematic survey and attempting to improve the present situation, a committee on occupational dermatoses was appointed at the meeting of the Section on Dermatology and Syphilology of the American Medical Association in 1935.

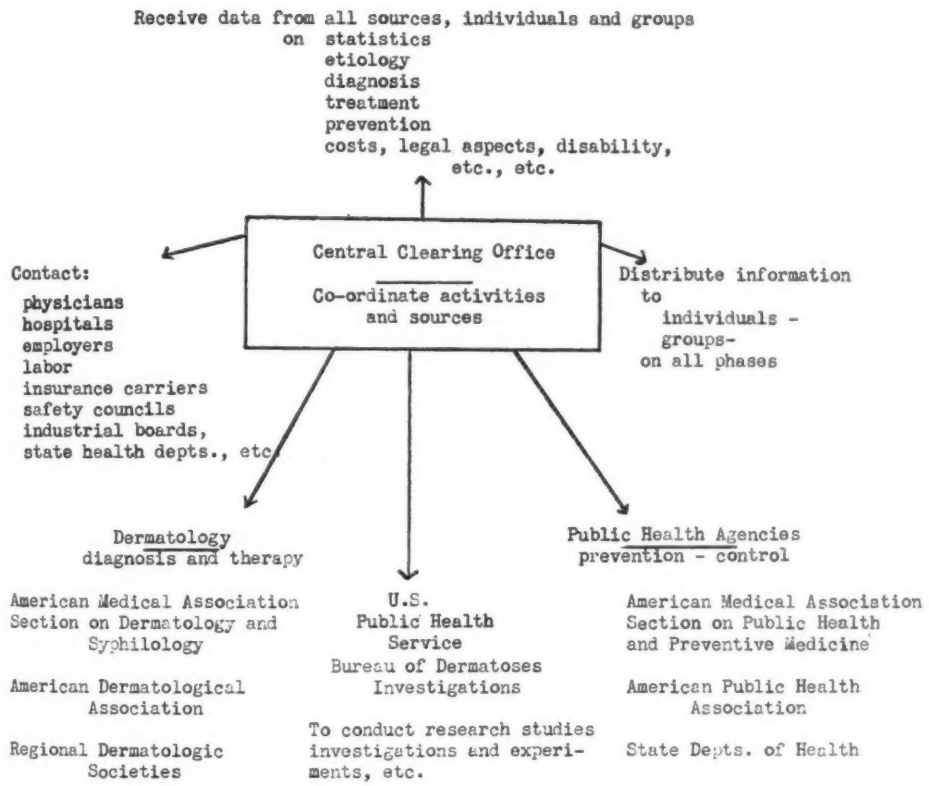
At the 1936 meeting in Kansas City this committee rendered a brief report to the effect that the committee should be authorized to continue its studies in cooperation with the Section on Preventive and Industrial Medicine and Public Health, the United States Public Health Service, and with the American Dermatological Association for the purpose of establishing a cooperative approach to the problems of industrial skin disease. It furthermore recommended that a central clearing house be established for the recording and dissemination of information on industrial dermatoses and also that local subcommittees in various geographical districts be empowered to gather information and report operations to this central committee.

Since that time the American Dermatological Association has authorized the appointment of a committee to aid the committee already established, and these two committees will work in harmony on the matter of occupational dermatoses. Dr. R. R. Sayers, former Chairman of the Section on Preventive and Industrial Medicine and Public Health, and an officer in the United States Public Health Service, is aiding in the establishment of divisions of industrial hygiene in various state departments of health for the purpose of bringing industrial diseases under medical supervision and control. Dr. Louis Schwartz, in charge of the office of Dermatoses Investigations of the United States Public Health Service in New York, has been carrying on very effective work in this field in his district and is cooperating very heartily with the work of the committee in furthering the attack on this group of diseases.

*Read in Section on Dermatology and Syphilology, Southern Medical Association, Thirtieth Annual Meeting, Baltimore, Maryland, November 17-20, 1936.

Table I

An Outline for the Study and Management
of
Industrial Dermatoses



In considering a method of cooperative approach to the betterment of existing conditions, it is apparent that there is at present no one source of information and that there is no teamwork in the matter of handling the situations which may arise. It is, therefore, of fundamental importance to devise at the start a general plan of organization to pursue in the future. The accompanying table indicates a plan which I have discussed with Dr. Harry Foerster for the organization of this work nationally. The main feature, as suggested in the report of the committee, is the establishment of some central clearing office to coordinate all the activities, encourage study and investigation, and provide sources of information. Such a bureau would make contacts with employers, labor, insurance carriers, safety councils, state and Federal industrial commissions, and so on, receive data from individuals and groups with reference to statistical studies, the matter of diagnosis and treatment, preventive phases, and even the legal aspects. It would keep in touch with and avail itself of the research and experimental work of the Bureau of Dermatoses Investigation, would keep in close contact with the dermatologists of the country to render an adequate diagnostic and therapeutic service. At the same time it would enlist the activities of the Public Health Service, state departments of public health, and individuals interested in public health questions for aid in the development of measures of pre-

vention and control. As an end result of the coordinating activities, it would be prepared to distribute information to all of these individuals and groups in accordance with such requests as might come to this bureau. In addition to this, it should be prepared to issue from time to time bulletins dealing with various phases of occupational skin conditions. Funds for the establishment of such a bureau are not yet available, but it is hoped that before long a beginning may be made in the formation of such a center.

If any organization plan is to be successful, it is necessary to have a clear-cut definition of certain fundamental matters. It will be desirable and necessary for this committee to consider the establishment of certain standards, or at least make certain suggestions in the interests of uniformity. Some of these I wish to discuss at the present time with the purpose of accumulating sufficient data upon which to base rational preventive measures.

(1) The committee can help us agree upon a term definitely and officially to identify this group and for insertion in the official nomenclature of diseases. The terms "occupational dermatosis" and "industrial dermatosis" can be latinized to agree with existing terminology. "Dermatergosis" has been introduced by Prosser White in England and, while it is awkward, may be the best single term to apply to skin diseases related to occupation. I believe that the designation which is adopted ought to be qualified in each case by the name of the skin disease present in that case, dermatitis, keloid, or whatever it may be, and by the causative factor as soon as discovered, and perhaps by the occupation if the exact factor is unknown.

(2) A definition of the term selected is indispensable in obtaining a unified action throughout the country. Sulzberger[5] has already suggested the following definition, expressing the need of legal opinion concerning any final definition to be adopted:

"When an employe suffers from any skin condition, or from the sequelae of any skin condition, in which his occupation can be proved beyond reasonable doubt to be, directly or indirectly, a casual or contributory factor, such employe is entitled to compensation commensurate with (a) the degree to which the occupation is responsible for the skin disease and/or its sequelae; and (b) the extent and duration of the skin condition and/or sequelae, the resulting discomfort, disability and/or disfigurement. Such employe is further entitled to the payment of the reasonable costs of adequate medical attention and treatment, administered through qualified physicians or hospitals, of his own choice; and such employe is further entitled to such reasonable costs of investigation, and of expert testimony as may be necessary in order to substantiate his claim."

Table 2

DEFINITION (after Sulzberger)

(A) Skin condition to be definitely industrial must be related to an occupation with due regard to the time element and beyond reasonable doubt
  (1) Directly from such causes as
    Mechanical
    Chemical
    Thermal
    Infectious—bacteria, fungi, parasites
    Actinic
  (2) Indirectly
    By complications of an occupational trauma, or the treatment of such a trauma
    By exaggeration of pre-existing skin disease
    Sequelae and complications to be regarded as industrial

In other words, a skin condition and its sequelae to be labeled of positive industrial origin must be, beyond reasonable doubt, related to the work of the individual, with due regard to the correct time relation between the alleged cause and the result on the skin, either *directly*, due (1) to mechanical action, (2) chemicals, (3) infections (bacterial, mycotic, or parasitic), (4) actinic rays, (5) or temperature effects; or *indirectly*, (1) to complications of an industrial injury or treatment of this injury, (2) or to exaggerations of already existing skin conditions.

The factor of sensitization, perhaps by a fun-

Table 3

Name Record Form Date
Address
Age Nationality M— S— Wid— Ref. by
Occupation Employer
HISTORY
  General health
  Prev. skin
  P. I.: Durat. Sites
  Sympt.
  Treat.
  Stopped work
WORK
  Prev. occup.
  How long with present firm
  Duration present job
  Details of process
  Substances handled
  Cleansing process, home, factory
  Changes in process, in substances, in cleansing
  Other individuals affected
  Work outside regular employment

gus infection or other agent and the activation of latest syphilis by trauma on the skin may possibly be worthy of consideration under the heading of indirect cause.

Sulzberger further suggests in his definition that the compensation be commensurate with (1) the degree of disability, discomfort, and resulting disfigurement; and (2) the degree to which the occupation is responsible.

There might also be considered in regard to compensation the part played by a previous skin condition (or syphilis), the part played by an individual susceptibility in a given case, as well as the part played by gross negligence on the part of the individual employe.

Table 4

RECORD FORM

EXAMINATION

Blo.	M. M.	Chem.	Blood
Brun.	Tongue	Treat.	Count
Moist	Teeth	Contag.	Smear
Dry	Gl.	Syph.	Wass.
Oily	Nails		Scales
Thin			
Hairy			

Eruption

TREATMENT

Local

General Hospital

Preventive

Mechanical, chemical, alter process
Give up job, temporarily, permanently
Advise returning to work

DIAGNOSIS AND OPINION

	(type)	(cause)
Dermatosis Industrialis		
D. I. Disability;	Partial	Complete
Probably D. I.	Temp.	Permanent
Possibly D. I.		
Not D. I. but		

(3) If a satisfactory standardization of record forms can be devised by the committee, it will provide an expeditious manner of recording pertinent facts and assembling more definite data. The form which I have used for many years has been of great service. It will need numerous changes for adaptation generally.

(4) A more uniform method of expressing the diagnosis is necessary for the mutual understanding of these cases. I have commented earlier on the value of such a plan.[7]

Table 5

MEANS OF EXPRESSING DIAGNOSIS

Diagnosis
- Occupational, positive, probable, possible, not
- Type (dermatitis, keloid, etc.)
- Cause (naphtha, heat, etc.)
- Occupation (treer, laundry, etc.)
- Disability, partial, temporary, total, permanent

(5) While a definition such as suggested above outlines the general features required for a diagnosis of occupational skin disease, more definite criteria are desirable in the individual case. In 1928 I discussed the need for such criteria and indicated them briefly as shown in *Table 6*.[8] Sulzberger[9] has also discussed recently the criteria of the industrial dermatitis group which is here presented in somewhat abbreviated form.

(6) There could well be established a more uniform method of reporting cases of occupational skin disease to employers, insurance companies, state departments of health, at least suggesting the minimum data. The punch card system can be used with advantage in the tabulation of such reports.

(7) In addition, the committee could well suggest that in the annual reports of state industrial

Table 6

CRITERIA FOR DIAGNOSIS

Definite D. I.	Probably D. I.	Possible D. I.	Not D. I.
HISTORY			
Exposure or injury	Relation less clear cut	Discrepancies in story	Definite evidence of other skin disease
Attacks	Substances less often causing irritation	Substances seldom irritate	
Amelioration			
No outside irritation		Other possible irritant	Definite relation to outside irritant
EXAMINATION			
Lesions consistent	Lesions less characteristic	Lesions more indefinite	
Location	Examination late	Other possible diagnosis	
No evidence of other skin	Condition nearly well		

Table 7

MEDICAL CRITERIA FOR ESTABLISHING PROOF OF PROBABLE INDUSTRIAL DERMATITIS (Sulzberger)

(I) Criteria of first order (indispensable).

(1) Inception—reasonable incubation period
(2) Amelioration—after cessation of exposure
(3) Recurrences and exacerbation on exposure

(II) Criteria of second order (adjuvant)

(1) Appearances in areas of maximum exposure
(2) Lesions and localization characteristic
(3) Reaction to presumptive causal agents
(4) Skin tests produce similar reactions
(5) Other fellow workers similarly affected
(6) Appearance soon after new exposure
(7) A dermatitis and not some other dermatosis
(8) Lack of exposure to non-industrial irritant

accident commissions, insurance companies, and so on, certain minimum data be included in order to obtain more accurate information and a truer perspective (*see Table 8*).

Table 8

ANNUAL REPORTS BY STATE DEPARTMENTS, INSURANCE COMPANIES, ETC.

Total cases of occupational disease
Total cases of occupational skin disease reported
Types: dermatitis, keloid, anthrax, etc.
Disability: none
1 week or less
1 to 2 weeks
2 to 4 weeks
3 months or over
Causes: textiles, printing, agriculture, etc., or by individual substances
Compensation costs
Medical costs

(8) The committee can also do its share in stimulating the passage of more uniform legislation in the various states as a part of its program of establishing standards of management of occupational skin disease.

(9) It is possible that a list of skin diseases in which an industrial causation is possible could be compiled. At least the frequency of the various manifestations could be established within a short time from the examination of past data and the reported cases.

The establishment of a central clearing office for occupational dermatoses, the establishment of more definite criteria and the development of more uniform methods of management will institute a new era, I believe, in the handling of occupational skin disease.

In addition, there is another matter of fundamental importance in connection with the part of the committee report dealing with the formation of various regional subcommittees. It is necessary that the dermatologists throughout the country develop a greater interest in the detection of these cases. An accurate diagnosis based upon a careful history and examination, with a determination of the causal factors, is required for rational treatment. The dermatologist can be of immense service, not only to the patient, the laborer, but can render invaluable service to the general practitioner, to the employers, to the various safety councils, and to the industrial commissions and insurance carriers who desire above everything else an impartial opinion in regard to each individual case of industrial skin disease.

The diagnosis and therapeutic management of occupational skin disease should always remain the province of the dermatologist. He is by training and experience proficient in the differential diagnosis of conditions such as scabies, erythema multiforme, or tuberculosis of the skin, from diseases of possible or probable industrial causation. He is familiar with various kinds of therapy best adapted for the various dermatological manifestations. He does need to broaden his viewpoint and become familiar with the processes and materials used in industry, and to keep pace to a certain extent with the ever-changing progress of industrial research in developing new substances and processes. He needs to become familiar with the compensation laws of his particular state. He must become familiar with the rights of the employer and the employe, and he must be prepared, as I have said, to render an impartial decision based upon all evidence submitted in a given case.

To train such men properly in this field there must be developed adequate industrial clinics, adequate instruction in industrial dermatoses, their causes and their prevention, and in such localities or institutions there must be access to adequate literature and opportunity for investigative work. Our medical schools, and especially their graduate departments, must be prepared to fulfill the need for the adequate training of dermatologists for this purpose, as well as physicians planning to enter industrial medicine and public health work.

I realize full well that such a project is an ambitious one and that much time and money will be needed even to approach accomplishment. It is with the hope that some measure of success will be achieved by the cooperation of the dermatologists and dermatological organizations

throughout the country that I am presenting such an outline to you.

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CLINICAL MANIFESTATIONS OF VIRUS DISEASES OF THE CENTRAL NERVOUS SYSTEM*

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The increase in number and the bizarre nature of conditions that are apparently due to virus infections of the central nervous system, force clinical neurologists to make positive steps toward their solution. The laboratory worker and the pathologists tell us what these filtrable substances do not do, and most definitions based on experimental studies describe negative behavior, which clinically is of little value. Rivers,[1] however, gives these infections three positive characteristics: first, that there is an intimate relation between virus and host cells, ultimately leading to the destruction of the cell; second, that there is a characteristic intracellular pathology; and, third, that there develops a lasting immunity. McKinley[2] classifies the virus diseases mainly on the ability of these agents to produce inclusion bodies in the cell, yet many known virus diseases have not been shown to produce inclusion bodies. Moreover, in the central nervous system, in the absence of inclusion bodies, there is no distinct pathological finding which can serve to distinguish an infection produced by a virus from one produced by a bacterium.[7] Freeman separates his virus produced encephalitis according to the point of major attack, namely: the nerve cell, medullary sheath or the tissues near or connected with the vessels. Hurst[4] states that in all probability viruses are obligatory intracellular parasites, and divides those attacking the nervous system in two classes: the type that strike primarily at specific neural elements; and, second, the type that exercise their pathogenic action mainly on the mesoderm. His first group he divides again into the neurotropic which live only in the nerve cell and, second, the pantropic which can live in non-nervous as well as nervous elements. Those that attack the mesoderm, for lack of a better term, he calls viscerotropic. Hurst[4] also states that so far there is no sure evidence that any of the primary demyelinating diseases are due directly to the action of a filtrable virus.

The above positive considerations are of value, but from a clinical standpoint classifications or differentiations by means of a specific causative agent still lead to confusion. These peculiar infections appear suddenly or gradually; they seem to follow no definite rules of behavior and, apparently, the same virus in one year may produce an entirely different picture clinically from what it had produced previously; for example, the encephalitis of today is certainly different from the encephalitis of 1918 and 1921. If clearness is to be maintained, classifications used clinically must depend on the structure involved according to the neurological examination and not according to etiology, so that the diseases are best divided into myelitis, encephalitis, meningitis, neuritis or combinations of these. This is especially true, since pathologically as well as clinically the greatest characteristic of the virus diseases is their predilection for certain organs or certain parts of the central nervous system.

Pathological studies then help us very little except to show the specific locality that was the object of greatest attack. Immune reactions also are of very little aid during the life of the patient. The study of experimental animals in the early stage of the disease seems to offer the greatest hope for the future,[4] but as yet the clinical manifestations of this type of disease of the central nervous system are an unsolved mystery, often stimulating fantastic thinking and leading to loosely drawn conclusions. Nevertheless, these diseases are on the increase, so it is necessary to have some form of hypothetical understanding, even if our conclusions are general and not exact. Therefore, five of the problems that trouble clinicians in this regard will be discussed in the following paper: (1) the nature of the abortive attack; (2) the signifi-

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cance of the "inapparent" or subclinical forms; (3) the importance of the precipitating factor which disturbs the equilibrium between cell and indwelling virus; (4) the ability of the same agent to produce varying clinical pictures under different conditions; and (5) the relation of a demyelinating disease such as multiple sclerosis to encephalomyelitis and to a previous virus infection.

During the summer of 1935 there was a marked increase in the number of cases of poliomyelitis in North Carolina and Virginia. In Albemarle County, Virginia, from July 9, 1935, until September 14, 1935, 163 cases of this disorder were reported. Fourteen of the group showed paralysis, five died and 144 could be classified as abortive cases. The diagnosis of the mild cases was disputed by many, especially those who wished to ignore the presence of an epidemic. However, during the summer of 1936, or for twelve months after the epidemic ceased, no new cases of poliomyelitis were described, although the normal rate for this community is from three to five cases a year. This result certainly suggests that the community is now immune to poliomyelitis and leads toward two conclusions: first, that at least the majority of the abortive cases were due to the "polio" virus, and, second, that there were many persons in the community infected, who did not consider a physician necessary because of the mild nature of the infection. F. M. Burnett,[5] in the *British Medical Journal*, discusses "the inapparent virus infections." He brings out especially the effect of age and that the first attack in a young individual is more likely to be of the inapparent form, while second attacks are prevented or modified by the immunity induced. The presence of immunity in apparently unexposed individuals is explained on this basis. It is suggested by some that the subclinical forms be used to immunize a community in order to prevent the more serious infections. The ramifications of inapparent subclinical and abortive cases of virus diseases have almost endless possibilities in explaining all sorts of conditions. Acute and chronic diseases that have not been explained; the low grade fevers; headaches; the so-called attacks of la grippe and other afebrile conditions which act as primary infections could easily be referred to as a low grade infection of this nature. It is necessary, therefore, to progress slowly, as there is danger of becoming virus "minded." On the other hand, these conditions are infections clinically and virus infections of low grade are so often followed by such dire conditions that it is well to consider the possible virus disease, because as knowledge advances more and more so-called idiopathic conditions are explained in this manner.

Next, it is interesting to speculate regarding the lasting immunity which is characteristic of a virus. Vaccines have been found in a few specific instances to produce immunity;[2] for example, the vaccine used in rabies. It is very questionable, however, whether this is a true vaccine, but rather an attenuated form of the living agent.[2] It is certainly true that ordinarily a living virus is necessary to produce immunity. Also, it has been demonstrated that these substances can exist without disturbance in plants and animals, and, yet, under proper conditions proliferate and produce a disease process.[7] How long they can exist in a cell without morphological change is not known, but it is certainly possible that they enter the body at the time of the subclinical attack and are later influenced by some precipitating factor to appear as a clinical disorder. Could not the lasting immunity depend on the virus living in equilibrium in the cell?

A great many different causes have been shown to precipitate the attack. Vitamin deficiency is given by some as the precipitating cause.[2] Herpes encephalitis in the rabbit follows trauma to the exposed eye. Bacterial infections act in symbiosis to produce central nervous system disease in louping-ill of sheep.[9] Virus diseases of the central nervous system also accompany many general infections, probably because the resistance is low, allowing the agent to proliferate.[8] In 1929, a premedical student suffered for several weeks from a severe attack of herpes zoster. The pain and rash were confined to the right side, but extended from the neck well down the trunk. In 1936, this same patient received a severe blow over the right ear; subsequently there developed pain in the right trigeminal, glossopharyngeal and lesser occipital nerves. This in turn was followed by partial anesthesia in the right face and paralysis of the motor portion of the fifth nerve and paralysis of the palate on the right side. Subsequently there was vertigo, nystagmus and double vision and, finally, a period of three days when the patient slept continuously. She could be aroused only to return to a deep sleep. Injection of pituitrin gave some relief from the pain, but only temporarily. The spinal fluid findings

were normal. There was no increase in temperature.

This case is used to present three possible characteristics of the infections under discussion: (1) that a virus may live in equilibrium in the cell; (2) that it may be activated by trauma; and (3) that in the presence of immunity it may act in an atypical manner. May we not consider that the herpes virus living in equilibrium in the cell is activated by the trauma and, because of the presence of immunity, acted in an atypical manner to produce a localized neuritis, which in turn was followed by an encephalitis? It is known that these agents do exist in the cell and that just because the disease is over does not mean that the virus is dead. It is known that these substances act in one way in one experimental animal and another way in another.[4] Vaccina, for example, is smallpox virus that has been passed through a calf. Human immunity also has been shown to affect the reactions to be expected. Gay and Holden,[10] working with herpes virus, have found a decrease in the virucidal power of sera from encephalitis cases when compared with the serum of normal adults. If immunity can affect the results to be obtained; if trauma can precipitate an attack; if virus can exist in the cell, is not it possible that this is what happened in this case?

It is interesting in this connection that during the twelve months previous to the poliomyelitis epidemic seven cases of encephalitis were studied at the University Hospital, but during the twelve months that followed September, 1935, there were eighteen cases reported. Also two cases of encephalomyelitis and four cases of choriomeningitis. From reports of physicians there has also been an increase in the number of cases of encephalitis and encephalomyelitis in the neighboring towns of Virginia. This increase of other forms of virus disease of the central nervous system in the face of a decrease or a complete absence of poliomyelitis suggests that immunity to poliomyelitis may affect the specific predilection of the virus to one portion of the central nervous system and cause other forms of the disease to be emphasized. Another explanation would be that these diseases throughout the country are on the increase and are now better recognized by physicians trained by their experiences during the recent epidemic. Still, it is remarkable that the major place of attack has changed from the anterior horn cells to other localities or to a generalized infection. Could the encephalitis and encephalomyelitis now seen be poliomyelitis acting in a modified form? Hurst[4] has shown that many froms of virus, although unable to produce an encephalitis when they approach the central nervous system by their accustomed pathway, when injected intracerebrally will produce many of the symptoms and signs of the disease.

Another factor influencing the type of clinical conditions found during virus infections is the pathway taken by the agent to reach the central nervous system. Experimentally, it has been shown that in many diseases of the nervous system due to virus the seat of maximal pathological change is in large part dependent upon the site of the inoculation or on the route of the natural entry of the disease factor.[4] Virus B gave encephalomyelitis when injected intracerebrally and acute ascending myelitis when injected intramuscularly in the flank or leg.[11] Many other examples of this same phenomenon could be given. It is proper, however, to say on the other hand that louping-ill affects the Purkinje cells in monkeys and that polio virus always tends to show its greatest activity around the anterior horn cells regardless of how they are injected.[4]

Aycock pointed out the effect of trauma and change of pathway on the virus of poliomyelitis when he showed the relation of acute bulbar paralysis from this disease to tonsillectomy.[12] At the time of the epidemic in Virginia, E. B., an 11-year-old girl, had her tonsils removed July 11, 1935. Eleven days later her mother noticed a slight speech defect. Thirteen days later, July 24, she had difficulty in breathing; she could not talk or swallow. On July 26 her breathing became very difficult and on July 27 she died. Her spinal fluid showed a sugar content of 111 mg., a cell count of 150 and a normal fluid chloride. This illustrates the fact that although the polio virus may maintain its specificity for the anterior horn cell, yet trauma and route of entry change the location of its greatest effect. It is often forgotten that poliomyelitis affects the cells of the substantia nigra almost as much as encephalitis lethargica. Therefore, immunity, route of entry or some other form of bodily disturbance may cause this virus to emphasize its cerebral rather than spinal behavior.

Finally, it is not mere supposition, then, to consider that immunity, that trauma or other form of shock, as well as portal of entry, may affect the localization and action of a virus in the central nervous system. It is, perhaps, on

the other hand, not so clear that they may lie dormant for a time and then be reactivated to behave in a separate and distinct manner. Yet, this latter statement must be accepted to permit the use of reactivation of a former subclinical infection of this nature as an explanation of many of the demyelinating diseases of the central nervous system.

The problem of demyelinating diseases is twofold: first, it involves the relationship between acute encephalomyelitis and acute multiple sclerosis. These diseases are considered the same by some and distinct entities by others. Also, it is considered by some that the chronic form of multiple sclerosis is nothing but a chronic form of encephalomyelitis and of virus origin. Others will consider chronic multiple sclerosis as a distinct entity, perhaps the result of some toxin, but at least not the product of infection. The second part of the problem of demyelinating diseases of the central nervous system is grouped around the discussion as to whether the myelin degeneration following the eruptive fevers is caused by the virus of the primary infection or is caused by the activation of such substances already present in the central nervous system.

In discussing the first problem Freeman,[8] McKinley[2] and others classify multiple sclerosis as a virus disease. Hassin[13] disagrees with this idea and seems to consider the demyelinization entirely as a degenerative phenomenon, probably the result of a toxin. Spiller,[14] Brain[15] and Grinker and Bassoe[16] have discussed the relationship between acute disseminated encephalomyelitis and acute disseminated sclerosis. They do not seem to make a very clear distinction between the two conditions. Turnbull[17] has stated, first, "I find it impossible to consider acute and chronic disseminated sclerosis to be other than the same condition." The fact is that most pathologists as well as clinicians consider acute multiple sclerosis and acute encephalomyelitis as identical diseases, and that some of them consider chronic disseminated multiple sclerosis as a development of the acute form. Brain and Strauss[18] state that clinically all gradations occur between disseminated sclerosis and neuromyelitis optica. Neuro-opticmyelitis is now considered a form of encephalomyelitis. Therefore, if acute multiple sclerosis is the same as acute encephalomyelitis, and acute and chronic multiple sclerosis cannot be distinguished and, finally, neuro-opticmyelitis shades into multiple sclerosis, clinically at least, they can be considered the same. The difficulties of the situation are illustrated by the following two cases:

On November 22, 1935, a student nurse 20 years of age entered the hospital complaining of pain in the calf of the leg of twenty-four hours' duration. Examination at the time of admission showed a positive Babinski on the right, a sustained ankle clonus on the left and an area of anesthesia over the left chest. On November 25, three days later, there was nystagmus in all directions, there was deviation of the tongue and weakness of the right side of the face. Her spinal fluid was normal. She gradually developed a paralysis of both legs, a loss of sphincter control and a bilateral optic atrophy. At the time of her discharge in January, 1936, she was practically well except for the optic atrophy. She returned one month later because she had become rapidly worse. She had diplopia, paralysis of the face on the right side, paralysis of the left leg and bilateral Babinski sign. In March she developed a flaccid paralysis of the right arm with atrophy of the small muscles of the hand, a condition suggesting involvement of the anterior horn cells supplying this extremity. She began to improve again and is now able to work. On examination, however, she has an intention tremor, temporal pallor of the discs with central scotomata, a slight unsteadiness of gait, but a normal plantar reflex.

This case was diagnosed spontaneous encephalomyelitis, but at no time was a fever demonstrated and the highest cell count in the spinal fluid was 22. Her improvement at this time is remarkable, but she still has many of the symptoms of multiple sclerosis. Could any one say this was not acute multiple sclerosis?

On December 12, 1934, a child 10 years of age was brought to the hospital because of blindness. This had been noticed for two weeks. There was no history of headache or other disturbance. On examination she was found to have bilateral optic atrophy. There was some haziness of the disc margins which suggested a previous papillitis. Spinal fluid examination was entirely negative except for increased globulin and 18 cells. The following May, six months later, the patient was admitted again. On May 4, she began to drag her feet; the following day she was unable to use her legs; she became drowsy and her head was fixed to the right, while her neck and back were stiff. Following this she developed a paralysis of both legs with bilateral foot drop; upper extremities were spastic, with increased reflexes and increased tone of musculature. Her temperature was normal and her spinal fluid normal. A few days later she could move nothing but her head and left arm; the left pupil was larger than the right; no reflexes could be found in the upper or lower extremities. Paralysis on the left seemed to be distinctly of a lower neuron type. The patient ran a slight temperature. Spinal fluid showed sugar of 59 and cell count of 2. The patient improved a good deal, was able to get up and was finally discharged to return February 12, 1936. She still has optic atrophy, although vision has improved on the right. There is an internal strabismus on the left; there is an intention tremor in the left arm; abdominal reflexes are absent; there is a foot drop on the left with a definite weak-

ness of the peroneal group of muscles. There is a bilateral ankle clonus with a bilateral Babinski sign.

This case did suggest in the beginning one of idiopathic optic atrophy or of neuro-opticmyelitis. Then, one year later, she had an attack of encephalomyelitis. At present any one seeing her for the first time would diagnose this as a case of multiple sclerosis because of the optic atrophy the nystagmoid motion, the absent abdominals and bilateral Babinski sign. It would be very hard for one, however, who has followed this case to feel that her difficulty were not due to infection.

It has been suggested that the acute cases of this nature which recover promptly be diagnosed encephalomyelitis, while those which pursue a chronic course be considered disseminated sclerosis.

Regarding the second group of demyelinating diseases, the greatest evidence seems to be on the side of those who favor the activation of a dormant virus. There is always, apparently, an incubation period of about ten days before the encephalomyelitis occurs. Yet, the injection intracerebrally of the virus which causes the primary infection, namely, vaccinia, smallpox and rabies, does not cause a similar condition in the central nervous system. Greenfield[8] states that "post-vaccinal and other forms of encephalitis which follow eruptive fevers are not directly due to the fever, but to another virus which is either stimulated into activity or is directed against the nervous system by the exanthum."[18] Certainly if this is true it again emphasizes the importance of subclinical or inapparent virus infections.

From the evidence presented up to the present time, therefore, the clinician must expect many varieties of virus disease. The "abortive case" of poliomyelitis should be accepted as an infection slightly more severe than the subclinical types, but a true form of the disease. Inapparent or subclinical infections of this nature are undoubtedly widespread and of tremendous importance in the understanding and control of human reactions to virus, especially, as these substances seem to be able to exist in the cell for varying periods and to be stirred into activity by many factors. Reactions of clinical severity, also, seem modifiable and to produce atypical pictures, especially if the pathway of infection is atypical. Viruses of many kinds may produce an encephalitis. Hence it follows that a certain virus cannot be selected as a causative agent just because a portion of the central nervous system shows greatest involvement. Finally, it would seem that the weight of evidence tends to make disseminated sclerosis and certain forms of encephalomyelitis the same disease and to explain these conditions, as well as the myelinoclasias following the eruptive fevers as virus diseases. In the latter case, however, the infection is not primary, but the eruptive fever activates a dormant virus which probably entered the central nervous system during some previous inapparent virus infection.

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DISCUSSION (*Abstract*)

Dr. Beverley R. Tucker, Richmond, Va.—Dr. Wilson's paper opens up a field of serious conjecture and experimental opportunity rarely equaled in modern medicine. He has presented it more in the form of argument than of conclusion. His reasoning is not only plausible, but appears to have the quality of basic soundness, than which nothing but proven fact is less than controvertible. Our friends of the legal fraternity say that circumstantial evidence is often more convincing than the statements of eye witnesses. Many supposedly settled medical investigations have turned out to be false and many that were at first thought to be false have been accepted as true. All of this is preliminary to the statement that we shall have to approach the question of virus invasion with both an open and inquisitive mind.

Robert Doerr, Professor of Hygiene at Basel, thought

that virus travels in several ways besides the usual conception of centripetal migration and passive transportation along perineural lymph spaces. Magrassi found that a strain of virus which developed no encephalitis may reach the brain and quickly develop immunity. He thought tract infection must be directed by a special mechanism. He found moveover that intravascular injections of herpes virus would cause encephalitis. When animals, he says, were subjected first to peripheral and then, after an interval, to intracerebral inoculations with encephalitogenic strains, the tract infection and the direct cerebral infection canceled each other and the animals lived and exhibited no symptoms, whereas any single one of the two injections inevitably was fatal (J.A.M.A., p. 980, Sept. 19, 1936).

I have for several years held that pellagra was in all probability a virus disease and that vitamin G or other food deficiency was merely a contributing cause giving lowered resistence like tuberculosis, alcoholism, morphinism, and chronic gastro-intestinal disturbance. The absence or rarity of pellagra in regions like northern India, southern Egypt, great areas of China, Porto Rico, Cuba, and other places, where the majority of the natives live on what might be called a pellagra inviting diet, would certainly tend to negative the food deficiency theory. Also the fact that in cold climates pellagra is absent or rare, but prevalent in adjacent warmer climates although the food, especially in institutions, is not essentially different, would point more to a climatic element than a food element in the causation. It should be borne in mind that on the Atlantic Seaboard pellagra is rare above the Potomac River and common in the south while acute anterior poliomyelitis is just the opposite.

My investigations of the neuropathology of pellagra, which I have not time to go into here, would indicate a virus invasion especially of the postero-lateral columns of the cord and the spinal sympathetic ganglia.

Dr. Wilson is familiar with the literature of virus invasions, and I like the word invasion in this connection. His experience has been so large and his paper is so fair and well expressed that it would be difficult to contend with his ideas. I am glad to say that with only a few minor exceptions I find that "my mind flows along with his." It is possibly well that but few positive conclusions have been reached. Positiveness may stir more argument, but negativeness induces more investigation. The positive characteristics of Rivers of virus infection that Dr. Wilson quotes, namely: (1) ultimate cell destruction; (2) especial pathology; (3) lasting immunity, may or may not be true in entirety. Some of the atypical cases Wilson mentioned in the epidemic around Charlottesville may have been misdiagnosed, but that is not the question for it is doubtless true that many of them were poliomyelitis. There are two lessons to be learned: first, that acute polio is not a disease limited to motor paralysis of one or more limbs or only to children, and second, that it may closely resemble other virus and bacterial invasions. In my opinion, clinical manifestations may go even further and resemble, especially in adults whose nervous systems may have gotten up some special resistance, an ordinary gastro-intestinal upset. I have noticed this concomitant with several epidemics.

The suggestion that multiple sclerosis is of the same origin as acute polio is open to serious question and I am inclined not to accept this idea for reasons too numerous to entertain in this brief discussion.

In conclusion, I should like to say that Dr. Wilson should be congratulated upon his excellent presentation of virus diseases which has given us a broader conception and will stimulate deeper study of these important, and evasive conditions.

Dr. James W. Watts, Washington, D. C.—I should like to say a few words about one of the virus diseases mentioned by Dr. Wilson, that is acute lymphocytic meningitis (choriomeningitis) which has only recently acquired the status of a virus disease. It was first described in 1925 by Wallgren and the first cases in this country were reported by Viets and Watts, having been observed on the wards of the Massachusetts General Hospital in Boston. This disease presents a clinical picture resembling tuberculous meningitis and our first cases were considered tuberculous meningitis. When the patients began to recover, further study of the spinal fluid findings revealed one striking difference between the two diseases. In tuberculous meningitis the sugar and chlorides in the spinal fluid are always reduced. In acute lymphocytic meningitis, the sugar and chlorides are normal. In the spring of 1929 we observed three additional cases which presented the same clinical picture and laboratory findings.

In 1934, Armstrong and Lillie of the National Institute of Health found a virus in mice and stated that the experimental disease closely resembled acute lymphocytic meningitis described by Wallgren. Dickens, of Washington, who had reported some of the earliest cases, supplied Armstrong with clinical material and these two investigators presented evidence showing that acute lymphocytic meningitis is a disease entity caused by a specific virus. They demonstrated that the blood of a patient who has recovered from the disease contains strongly positive antibodies against the virus. Because Armstrong and Lillie found swelling and lymphocytic infiltration of the choroid plexi in addition to meningitis, they applied the name "benign lymphocytic chorio- meningitis." Dr. Viets and I prefer the term "acute lymphocytic meningitis."

Dr. Wilson spoke of subclinical forms in virus diseases. He mentioned the epidemic of acute poliomyelitis which occurred in Virginia in the summer of 1935 and stated that in a series of 163 cases 14 were paralyzed, 5 died, and 144 were abortive cases. Some of us who have been interested in acute lymphocytic meningitis thought that many of the abortive cases might be acute lymphocytic meningitis. A number of these patients were tested by Armstrong and all failed to show evidence of antibodies against the virus of acute lymphocytic meningitis.

Dr. Wilson (closing).—I am very sorry that Dr. Goodpasture was unable to be present and discuss my paper, as I am sure he would disagree with me on many parts of it. Dr. Tucker has helped by explaining many points that were not clear. He does not agree as to the origin of multiple sclerosis and I do not agree with him as to the virus origin of pellagra.

This paper was presented with the idea of bringing up a good many points for discussion and not with the idea that the conclusions reached were by any means proven, or should be accepted generally. I hope that it will stimulate investigation of virus infections.

FRACTURE DISLOCATIONS OF THE UPPER END OF THE HUMERUS*

By GUY W. LEADBETTER, M.D.
Washington, District of Columbia

The series of cases to be reported limits itself entirely to that type of injury involving a complete fracture of the surgical neck of the humerus combined with a dislocation of the head of this bone. The literature on this subject is rather meager. There are very few series reported and there is no definite summary of the functional end results following the treatment of this type of injury, nor is there any general accord as to the methods to be used for reduction or after treatment. One of the largest groups was reported by Buchanan. He included 14 cases, of which only 2 were admitted as good results, the remaining number being from fair to poor.

Most textbooks pass the subject rather lightly and emphasize no definite line of attack, but admit that the results are bad. Authoritative writings show a wide diversity of opinion concerning the proper approach to this injury, some advocating immediate removal of the head with certain reservations, others condemn this procedure, still others advocate the use of the screw traction apparatus of Boehler with manipulation of the proximal fragments, and some prefer to utilize open reduction at once. Two authorities who have written most recently on fractures discuss the subject fully from a broad point of view and agree as to the necessity of individualization of treatment.

It is with the hope of stimulating interest in and study of the end results of these injuries that these case reports are presented of a problem injury of the shoulder girdle. It is time to take stock and determine whether some one or more satisfactory procedures may be instituted which will bring a larger number of reasonably good functional end results.

I have collected and analyzed 17 cases which have come from the fracture service of the Emergency Hospital in Washington, District of Columbia. All of these cases had complete fractures of the surgical neck, together with a complete dislocation of the head.

The mechanism which caused these fracture dislocations is of interest. In all 17 cases it was the result of a large amount of force. Two instances occurred as the result of automobile accidents and the remainder by falls from a considerable height. Both of the automobile victims were struck while the cars were in motion. Those who suffered falls, with the exception of one patient, fell from porches or down a flight of stairs; the one exception gave the history of a direct fall to the floor on the apex of the shoulder itself.

The same application of force which produces a dislocation occurred in each of these cases and this force was so great as to produce the combination of fracture and dislocation.

This is an injury of middle age and later life. I have a case, however, that occurred in a child of 4 years in which there was a separation of the epiphysis together with an anterior dislocation of the head. This was one of the two struck by an automobile. Of the remaining 16, 2 occurred in the decade between 30 and 40, 5 in the decade between 40 and 50, and 9 in the years over 50.

All of these patients were in extreme pain and 13 of them gave evidence of true shock, indicating again the severity of the injury and the damage done to the soft structures. Nine, or approximately one-half of the number, showed comminution of the head of the humerus.

At this point may I say that the x-ray is not always an infallible instrument in determining the presence or absence of comminution. I have been surprised many times at operation to find that a head which appeared intact in the x-ray film was much comminuted at open operation and presented a very real problem for restoration.

Of this series, 2 cases were treated satisfactorily by suspension traction, together with gentle manipulation of the proximal fragment from day to day. Ten cases were reduced with fluoroscopic control by means of strong traction on the arm and digital manipulation of the head. Five cases were treated by open reduction and of these, in one the head was completely removed, placing the rounded end of the shaft in the glenoid. Of the open reduction group, 5 in number, 2 died. Both of these were suffering from cerebrospinal syphilis. One died on the fourth postoperative day, the result of cerebral hemorrhage. The other died on the tenth postoperative day from secondary hemorrhage of the subclavian vein. In both these individuals, manipulation with fluoroscopic control had been attempted without anesthetic. During the course

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of these manipulations, these 2 patients felt no pain whatsoever and were completely relaxed. It was, however, impossible to reduce the dislocated head and two days later open operation was done.

There is a striking difference in the period of hospitalization in those reduced by closed manipulation and those by open. Those done by the closed reduction method remained in the hospital from 2 to 23 days, with an average of 9.3 days. The 2 traction cases remained in the hospital 24 and 27 days, an average of 25.2 days. The 3 patients who recovered after open reduction remained in the hospital from 48 to 65 days, an average of 56 days.

Except for the 2 cases in traction, plaster fixation was used in all. Of the 10 treated conservatively, 4 were placed in a plaster Velpeau and 6 in varying degrees of abduction from 45 to 90 degrees for a period of 4 weeks. All of those treated by open operation were placed in a plaster Velpeau for the same period. Infection occurred in one. Following the removal of the fixative apparatus, physiotherapy with gentle passive motion and moderately active exercise was begun.

With 2 deaths, there are 15 cases in which end results may be determined. Of these, the group of 3 cases of open reduction shows a fair result in one with 75 degrees abduction and poor results in the other two with 50 degrees abduction. All are much restricted in rotation and pain is irregularly present. Of the 10 cases treated by manipulation with fluoroscopic control, 1, that of the 4-year-old child, shows a perfect result with all motions normal, except for the slightest limitation in rotation. Five show fair results; of these, 1 abducts to 100 degrees, the other 4 to 90 degrees. In all, however, rotation, both internal and external, is considerably restricted. The remaining 4 in this group show 2 cases with 80 degrees abduction and 2 with 70 degrees. These 4 also show loss in rotating power at the shoulder. In 6 pain is present and contributing to disability. The 2 cases which yielded to traction show fair results, both allowing 90 degrees abduction and limited, although more, rotation than in the other groups. Pain is not present in either of these patients.

It would seem, from the foregoing analysis, that consideration should be given to the economy of finances and time, as well as to better end results. It is evident that wherever a satisfactory closed reduction can be obtained, there is a material shortening of the period of hospitalization (an average of 9.3 days as compared to 56 days) and also a lessening of the time of complete functional disability. The functional results are very much better following satisfactory manipulative procedure, but here it may be said that, as in all complete dislocations, early treatment yields the easiest and best reduction. In the cases treated by open operation, the functional results are not as good, but here again there seems to be evidence pointing to the fact that early operative intervention gives better results than waiting. One can only condemn delay until the shaft has united to the head. By so doing, one may secure bony union, but is then faced by the very difficult procedure of doing an open reduction on a dislocated head of the humerus. These difficulties have been pointed out by Bennett in his recent article in the *Journal of Bone and Joint Surgery* of July, 1936.

So much trauma is done by the open operation that very often the functional result may be affected materially by the necessarily destructive type of procedure. I refer to the disability often present in the deltoid muscle and to weakness in the action of the pectoralis major and subscapularis muscles, if at operation it is necessary to divide and suture these structures. Furthermore, even with the use of the McBurney hook and skid, considerable force is often necessary to replace the head satisfactorily within the glenoid. It frequently happens that a very small vestige of the anterior capsular ligament of the shoulder remains, so that proper repair is sometimes impossible. These conditions make for a very limited function of the shoulder joint. If operation is decided upon, again emphasis should be laid on early operation. The longer one delays, the more difficult the task and the less the chance of obtaining a good arm. Even a delay of one week increases the difficulty.

A comminuted head presents a problem. It has been my rule to remove all the small, comminuted fragments except the major one, place it in as accurate a position as possible in order that a cartilaginous surface may be opposed to the glenoid and that some vestige of the true neck of the humerus may remain. In those cases in

which this was not done, extreme disability resulted and a second operation was necessary to remove ununited fragments of the head. In one case, an arthrodesis was finally done to relieve pain. Removal of the head was done in only one case and, while it is true that the period of hospitalization was extremely short (only 5 days) the functional result was not satisfactory, although weak motion was obtainable at 40 degrees with a small amount of rotation. The reasonably good end results seem to be proportionate to the ease of the reduction.

In summation, may I say:

(1) At present there is no single method for treatment. Each case is a law unto itself.

(2) This injury occurs rarely in children, there being only one such case in this series. It is rather an injury of middle and later life.

(3) Very early reduction, closed if possible with fluoroscopic control, yields more satisfactory functional results and lessens the stay in the hospital, as well as diminishing the length of disability.

(4) Open operation should be done where the closed method fails. It should be done early, comminuted fragments should be removed and suture through the head and neck of the humerus may or may not be used, at the discretion of the operator. Following all open reductions where the head may be freely rotated into position, the arm may be placed in a plaster Velpeau bandage.

(5) It is better to remove comminuted fragments than to attempt a satisfactory reduction with fragments present.

(6) The removal of the head is not a satisfactory procedure when it can be avoided, as it often leaves a painful, weakened shoulder and one materially limited in motion.

(7) Arthrodesis may be performed as a last resort.

(8) Traction, together with judicious manipulation from day to day, may be used in selected cases with satisfactory results.

(9) Open operation is, at its best, not a procedure of first choice inasmuch as unavoidable trauma to the soft structures results in considerable loss of function.

DISCUSSION (*Abstract*)

Dr. Robert V. Funsten, University, Va.—It seems unusual to hear Dr. Leadbetter speak enlighteningly on a subject far removed from the hip, his hobby, and a field to which he has contributed much.

I have been most interested in hearing his reaction to the treatment of injuries about the shoulder joint and it leads me to review my own experience and some of the outstanding adventures.

In considering the question of removal of the head in fracture combined with dislocation, I feel from Dr. Leadbetter's remarks, rather pleased to say that I have had little experience. A case which I remember all too well was seen several weeks after an attempted open reduction. The attempt was repeated, and, due to the fibrosis, the return of the head to the glenoid in a viable state was probably impossible. The head was removed and two years later there was approximately a 60 per cent recovery of function in the shoulder joint.

Recently I have had the opportunity to observe a case in which the head was removed in another city, and after five years the function of the shoulder joint is also approximately 60 per cent of normal.

In another case of open reduction, the question of removal of the head was considered seriously, but was not done. This man developed a low-grade infection but recovered in the course of a year with about 50 per cent function in the shoulder. After returning to work, he fell, breaking the shaft of the humerus, but made a prompt recovery.

I have felt, as Dr. Leadbetter does, that, except in the most extreme cases of comminution with dislocation, the chances are better for recovery of function if the head is replaced with as nearly its normal contour as is possible. If treatment is delayed, however, the removal of the head may become justifiable.

In accomplishing reduction under the difficult circumstances existing in fracture dislocation of the head of the humerus, traction combined with finger manipulation has been our best means of accomplishing the reduction. After this a loose Velpeau bandage is applied for two or three weeks following which a neck-wrist strap, either with or without a weighted cast, is employed. This is combined with active motion. The average time for recovery has been about eight weeks and the slow loosening up of the joints which exists in the prolonged cast treatment has been avoided.

In an instance in which the head was still dislocated after a period of seven weeks following injury, a closed reduction was accomplished, but there was recurrence. The tuberosities were fractured. At an open reduction later, the shoulder was made to maintain its normal relationship by the use of the Nicola operation and an excellent functional result was obtained.

Although the cases of dislocation accompanied by fracture of the tuberosities are sufficiently complicated, still I feel that they are a very much less difficult problem than those in which fracture of the humeral shaft is combined with dislocation.

CORRELATION OF CLINICAL AND ANATOMICAL STUDIES OF THE VESICAL NECK*

By R. E. VAN DUZEN, M.D.
and
W. W. LOONEY, M.D.
Dallas, Texas

In 1934 we presented a paper before this Section entitled "Anatomical Studies of the Vesical Neck." We were criticized because our conclusions were made from gross anatomical specimens. We have since made a study of the microscopic slides taken from the bladder neck. We regret our work is not completed and that we are compelled to make only a preliminary report.

We find the bladder wall is made up of an external longitudinal layer of muscle fibers, a middle circular and inner longitudinal layer extending from ureteral orifices into urethra. In 1934, we described the structure of the internal urethral sphincter based on a series of dissections of female bladders. In that paper we drew the conclusion that the muscle fibers immediately surrounding the urethra were in the form of complete rings, while the more outlying fibers only partially encircled the urethra. We also agreed with Young and Wesson that the trigone muscle crossed over the internal circular fibers and descended along the posterior wall of the urethra for a considerable distance. We thought, as did these authors, that the trigone muscle probably acted to open the internal urethral orifice by pressing downward and backward on the sphincter band. At that time, however, we expressed doubt as to whether the trigone muscle was the sole factor concerned in the opening of the orifice and stated that further work should be done on the structure of the internal sphincter before a positive conclusion could be drawn.

In a later paper, based on a study of the vesico-prostatic junction, we expressed the opinion that there was no structural demarcation between the bladder and prostate, that many of the longitudinal fibers of the bladder passed directly into the prostate and formed the chief musculature of the latter structure. More recent studies convince us that we were essentially correct in our view.

It was while making this second study, however, that our attention was again drawn to the vesical sphincter. We noted in stained sections, which were cut vertically through the vesico-prostatic junction in the region of the urethra, an intermingling of the longitudinal and circular fibers of the bladder in the region of the neck of the bladder. We could see very clearly in one male specimen that as the longitudinal fibers passed down into the prostate, the deeper fibers mixed with and apparently curled underneath the circular fibers. We made further studies in the infant female bladder and found what we believed to be a similar arrangement. This observation is similar to that reported by Dragonas except we find the inner longitudinal or trigonal layer does not interlace with the external longitudinal but act as a separate structure. Dragonas and later Loughnane felt the contraction of the external layers and the trigonal layer constituted the same act. We believe they are entirely separate in function.

While our study is yet far from complete, we merely wish to express at this time the opinion that further studies may show that the true structure of the internal sphincter may after all be very similar to the structure of the various sphincters found in the gastro-intestinal tract, that is, the longitudinal fibers pass first external to the circular fibers and then intermix with and curl underneath the circular fibers.

If further study proves this view to be true, then we can explain the opening of the internal urethral orifice in a similar manner to the way we explain the opening of any other sphincter, that is, as the longitudinal fibers (detrusor fibers of the bladder) contract by virtue of their connections with the circular fibers around the urethral orifice, they are able to pull the latter open and permit an unobstructed flow of urine.

At the meeting of the Western Branch of the American Urological Association, we reported that during the cystoscopic observations, if we rotate the instrument to "3 or 9 o'clock on the dial" and instruct the patient to try to void, we see the internal vesical wall draw away from the instrument in a similar manner to that which occurs when one watches the trigone contract and depress the posterior lip of the vesical orifice. This continued to be observed in those patients in whom the trigone muscle had been paralyzed by cutting the presacral nerve. We

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have previously reported the observations that after presacral neurectomy, the trigone is paralyzed and the urethral orifices are widely dilated. And from the recent cystoscopic observations, we feel the muscles which pull away the internal vesical wall on the lateral (3 or 9 o'clock) segments are not innervated by the hypogastric but by the sacral nerves.

We have also observed in our laboratory experiments on the Rhesus monkey, that stimulation of the second sacral nerve produces a wave of contraction starting at the region of internal vesical orifice and then extending up toward the dome of the bladder like the systole of the heart. This can be observed in a lesser degree in the dog, which does not empty the bladder completely with each voiding.

We have tried to correlate our cystoscopic observations and those on the experimental animals with our findings in our dissections and more recently the microscopic slides from the vesical neck.

Young first suggested in 1918 that the trigone helped to open the internal vesical orifice. He stated:

"This brings up the question of the part taken by the trigone in the act of urination. It seems to me to indicate that one function of the trigone is to pull open the interior sphincter of the bladder. I have long held to this view, as I have frequently observed, during cystoscopy, that if violent desire to urinate came on, the trigone would contract greatly and the prostatic orifice would open widely. The median, posterior portion being apparently drawn backward by the muscle fibers which run from the trigone down in the posterior urethra, and which were seen to contract violently. The opening of the internal sphincter during urination will have to be viewed, therefore, not as an inhibitory action, as heretofore, but as the result of the contraction of the powerful trigonal muscle, which passes in the form of an arc through a weaker muscle of circular shape (the vesical sphincter) and pulls it open when it contracts."

Dragonas questioned whether the trigone was able to open the sphincter. Loughnane believes the active opening of the internal vesical sphincter is produced by contraction of the trigone, which pulls upward and backward the posterior lip of the internal vesical orifice, in contrast to the views of Young and Wesson that the contraction of the trigone muscle pushes the posterior lip backward. We feel that Young and Wesson are correct, but that there is also an additional and much stronger contraction of the external longitudinal muscle fibers interlacing with the circular fibers which further opens the internal vesical orifice. We believe this is what Dragonas and later Loughnane interpreted as the action of the trigone. We found in women with injuries to the trigone after childbirth that they have a history of delay in starting the stream and the need to strain. This was also noted in cases with paralysis of the trigone after presacral neurectomy. In injuries to the trigone, it is probable that some fibers of the external longitudinal muscle layer are injured. But the function of these muscles is not disturbed by presacral neurectomy and still these patients often have to strain to urinate. If one will examine the case reports of Learmouth, he will find it was frequently necessary to resect a wedge from the internal vesical sphincter. In other words, they had difficulty in voiding when they lost the action of the trigone muscle. From these observations we must draw the conclusion that the action of the trigone is very important in opening the internal vesical orifice.

But, as Dragonas has stated, this muscle is very small in contrast to the circular fibers and it is doubtful if it is sufficient to open the sphincter. Dragonas also pointed out that contraction of the trigone alone would only change the internal vesical orifice into a slit opening which would not be sufficient to allow the urine to pass. We feel that (1) the arrangement of the external longitudinal fibers which interlace with the circular fibers and in fact often loop around bundles of circular fibers, (2) the observation that in the Rhesus monkey stimulation of the sacral nerves produces a wave of contraction starting in the region of the internal vesical orifice and spreading backward toward the bladder dome, and (3) the cystoscopic observations that the lateral walls pull away from the instrument just like the posterior lip point to one deduction, namely: the external longitudinal muscle fibers play a very important part in opening the internal vesical orifice.

We feel the trigone pushes down the posterior lip of the vesical orifice first, but almost simultaneously the contraction of the external longitudinal muscle fibers attempts to pull the circular fibers of internal vesical orifice over the urine content of the bladder just as the contracting uterine muscle attempts to pull the cervix over the oncoming head of the child, and just as the rectal and pyloric sphincters are opened. As stated before, we hope to make further microscopic studies of this structure and by reconstructive

methods try to prove or disprove our clinical observations.

Since we have begun these studies, we find we are explaining many unanswered problems encountered in cystoceles, nerve disturbances of the bladder and more frequently the complications after prostatic resection. We have seen several cases in which there was a diaphragm composed of muscle tissue at the region of the internal vesical orifice which caused marked difficulty in urination. When the patient attempted to void, no lateral retraction was noted or the diaphragm became even more prominent. In one case there was a slight depression of the posterior lip of the internal vesical orifice suggesting that the trigone had become adherent at this area. The prostatic tissue had been well resected. Attempts at resection of this diaphragm had given no results. Mecholin and the repeated use of the Kollman dilator has given good results in these cases.

In conclusion, we wish to point out that the external longitudinal muscle fibers of the bladder detrusor muscle interlace with the circular fibers of the internal vesical orifice and perform a very important function in opening the internal vesical orifice at onset of the act of urination.

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DISCUSSION (*Abstract*)

Dr. Hugh H. Young, Baltimore, Md.—There is much misapprehension concerning the anatomy of the vesical neck and the physiology of micturition. Much confusion has been caused by attempts to experiment on animals by stimulating certain nerves above the bladder, and by cystometric studies. It is only necessary to watch with the cystoscope, while the patient urinates, to see what happens. In just such conditions twenty-five years ago, while I was observing a small median lobe, the patient cried out that he had to urinate. As my cystoscope was provided with a shield, I said, "Go ahead." I saw for the first time the important part which the trigone played. Bell's muscles contracted violently, drawing the ureteral orifices downward, and pulling the small middle lobe, which I was observing, abruptly backward, so that it was almost lost in the tissues. At the same time the detrusor muscles of the bladder went into violent contraction, the vesical neck became a triangle, with its short base downward, and urine gushed violently out. Studying the act of micturition from the urethral side, I saw the same process and the triangular orifice produced by contraction of the trigone, which became greatly elevated until the bladder was emptied, when the contraction ceased, the elevation disappeared and the middle lobe rose again into the vesical orifice.

I published these observations in 1918 in *Surgery, Gynecology and Obstetrics* (26:608). Two years later, at my suggestion, Wesson made an exhaustive study of the muscles of the bladder and vescial neck, and published his excellent report. Wesson and I then wrote a paper on the surgery of the trigone, and Macht and I wrote one on the physiology of micturition. Macht's experiments with the nerve supply in the trigone and other portions of the bladder confirmed my observations of the mechanics of micturition. Since then in nearly all cases with median lobe obstruction, we have found hypertrophy of the trigone and trabeculation of the bladder.

Frontz and Landes showed that when only the lateral lobes were enlarged and no obstruction in the middle lobe was present, the trigone did not become hypertrophied. (It had nothing to pull down).

Dr. Van Duzen's demonstration of the part played by the lateral detrusor muscles in holding open the vesical orifice is an interesting finding, and confirms our view that the act of micturition is from first to last an active process, being initiated by the trigone which holds the neck open with the assistance of the lateral muscles, which also take part in expelling the urine with the other detrusors.

Dr. Raymond Thompson, Charlotte, N. C.—Dr. Van Duzen has observed clinically that the trigone serves an important function in the first part of the act of urination, but he goes further and finds evidence that the external longitudinal fibers of the detrusor muscles also enter into the opening of the vesical orifice by traction on the circular fibers.

In the past we have disregarded the musculature of the prostatic area and stressed only the removal of glandular tissue; from this research it would appear that we should study more about the anatomy and physiological function of the muscle fibers of the vesical neck.

In distortion of the vesical neck, such as a diaphragm found at the region of the internal vesical orifice, following prostatic resection, I am wondering what part the infection takes and what part the musculature would take.

Is frequency of urination due to the infection of the mucosa of the prostatic urethra and bladder and the connection with the nerve supply, setting up the first part of the reflex system? The greater the first part, naturally the more frequent urination.

MEDICAL EDUCATION IN NEW SPAIN*

By WYNDHAM B. BLANTON, M.D.
Richmond, Virginia

I

In this country, with pardonable anglophilia, we are apt to date the beginning of things from the settlement at Jamestown or the landing at Plymouth, and we think of the beginning of American medical education in connection with the early efforts of John Morgan and the founding in 1765 of the medical department of the University of Pennsylvania. We are apt to pass lightly over the fact that there was already a flourishing Spanish civilization in this hemisphere a hundred years before the coming of the English, and that medical students were being graduated in numbers from the colleges of New Spain two hundred years before our first matriculates in the English colonies.

When Columbus discovered America in 1492 he found more than virgin forests and strange red men. He exposed a civilization in many respects as wonderful as the Egyptian, some say as ancient. In that part of the New World to which he steered his course no less than three great races, each with a remarkable medicine, had flourished. Among the Incas in Peru, medical practice was in the hands of the priests. In addition to the administration of medicinal herbs, they skillfully employed phlebotomy and massage, though mingled with the mystery and magic of incantation. Clay vessels still realistically preserve the grim details of their diseases. The ancient Mayan civilization of the Quiche of western Guatemala is said to have records dating back to the Eighth Century. In this Indian nation, dentistry, ophthalmology, psychiatry and hydrotherapy were of as high an order as their sculptural and architectural remains would suggest. It is to the Aztecs, the third and latest of these races, that we must turn in particular for an appreciation of the earliest medical education in the Western World.

As will be remembered, the Aztecs appeared in Mexico in the early part of the Fourteenth Century to absorb the earlier civilizations. Among them was practiced a type of medicine strongly resembling that of the East, with physicians, surgeons, midwives, herbalists and witch doctors. They had hospitals and institutions for incurables. Medical instruction was given in priestly colleges where the art was chiefly hereditary. Botanical gardens were attached to these schools of medicine and a great variety of medicinal plants were cultivated. Aztec physicians recognized gonorrhea and syphilis, and were well versed in hygiene. They laid stress upon venesection, scarification, baths and diet. They employed suppositories, clysters, inhalations, emetics, purgatives, narcotics and diuretics, and their knowledge of poisons and antidotes is said to have been extensive. Their surgery, distinguished by the dexterous use of obsidian instruments, sutures of hair, and the ingenious application of immobilizing dressings in the treatment of fractures, astonished the first Spanish settlers.

II

This, in brief, was the medical heritage of Cortez and his followers when, in 1519, they conquered Mexico and dethroned Montezuma. Much of it they appropriated. With enthusiasm Spain sought to capture the secrets of Aztec therapy, and quantities of new medicinal plants were systematically sent back to Europe. Medical teaching was continued and extended, Aztec students in Spanish colleges preserving the native medicine. In much the same spirit that later animated the sponsors of the Virginia Colony in establishing a college for Indians, Bishop Zumarraga founded, in 1535, the College of Santa Cruz in Tlaltelolco, the Indian quarter of the City of Mexico, the first institution of higher learning in the New World. Here, besides philosophy, Latin, music and the native languages, medicine formed a part of the curriculum. The faculty was largely imported from Europe. One of the earliest and most eminent native teachers was Bernardino de Sahagun, founder of American anthropology.

Proof that medical teaching flourished in this college before the middle of the Sixteenth Century is the Badianus Manuscript recently discovered in the Vatican Library. This rare manuscript is a herbal written by two Aztec students of medicine. The exact title reads: "A book of Indian Medical Herbs composed by a certain Indian physician of the College of Santa Cruz, who is not theoretically learned, but is taught only by experience. In the year of our Lord Saviour 1552." This Indian physician

*Read in Section on Medical Education, Southern Medical Association, Thirtieth Annual Meeting, Baltimore, Maryland, November 17-20, 1936.

was one Martin de la Crus. The translator signed himself Juannes Badianus.

This earliest American book on medicine was dedicated to Don Francisco de Mendoza, son of the first viceroy of New Spain, a man much interested in the New World's medicine. He was among those constantly sending Indian remedies back to Spain. One of the results of his interest was the now much prized book of Nicolas Monardes, a "Phisition of Seville," called *Joyful Newes out of the New Found Worlde.* It was written in 1569 and believed, until the discovery of the Badianus Manuscript, to be the first American materia medica.

The College of Santa Cruz was not the only early Mexican institution of higher learning. We pass rapidly on to the founding of the most important with which we shall concern ourselves in some detail.

The Royal and Pontifical University, as this first university was called, was founded in 1554. It was modeled after the University of Salamanca, one of the famous medieval universities. It will be remembered that the physical side of the medieval university received little attention. There were no great buildings of brick and marble. At Bologna, for example, students met in the houses of their professors. In Paris lectures were given in hired rooms. In Mexico City, said by travelers at that time to be as magnificent as any city in Europe, a variety of scattered buildings were used for teaching purposes by its infant university. Graduation exercises took place in the Cathedral, for the church of course was still the repository of all learning. Students lived in private houses.

When medicine as a course was introduced into this university in 1580, medical teaching in America was put upon a plane approximating that of medical teaching in Europe. The earliest chair of medicine was known as *Prima de Medicina.* Juan de la Fuente was its first incumbent. It taught all that was related to the "healthy body" and was comparable to our physiology and hygiene. This subject was taught throughout the four years of the medical curriculum, sections from Hippocrates, Galen and Rhazes serving as texts. In 1599 a second chair of medicine was created, known as *Visperas de Medicina.* Juan de Plasencia was its first occupant. It was concerned with the "sick body," in other words, with pathology. As in the other chair, instruction covered four years, and assignments for reading were from Hippocrates, Galen and Avicenna. In 1621 a third chair of medicine was created. It was known as *Methodo Medendi,* and embraced what we now know as therapeutics, materia medica and pharmacy. Until Riverius was substituted two hundred years later, Galen was the only text. In the same year the chair of *Anatomia y Cirugia* was added, its first occupant bearing the musical name of Cristobal Hidalgo Vendaval. Dissection was not a part of the course until much later, when in somewhat desultory fashion a dissection was conducted three times a year, often without even the presence of a professor, though to be sure, it was customary for all professors and students to assemble once a month to look at an old skeleton and some rusty instruments. In 1833 the chair of anatomical dissection was finally created.

All professors were called "Doctor" in this Spanish university, although in the medieval university "doctor," "master" and "professor" were used synonymously. For a vacant chair competition was keen. Applications giving the life history and qualifications of the candidates had to be filed in advance. A subject for debate was chosen with ceremony by a twelve-year-old boy, and on the appointed day the applicant defended the subject in writing, his opponents refuting the arguments, also in writing. An oral debate followed on another day, each candidate speaking in Latin for no less than an hour and a half by the hour glass. Thereafter for three more hours there was further argument and rebuttal by the opponents. It is easy to see that this "choice by opposition," as it was called, often required several days for completion. The decisive voting was done by the authorities in the palace of the archbishop and then the successful applicant's name was announced.

Feasting of the faculty by the students and the presentation of gifts and gratuities to the professors was a custom here as well as in the European university. Salaries were surprisingly small. In 1626 the holders of the principle medical professorships received from 300 to 400 pesos a year, an equivalent of about $200.00. They were not permitted to teach extramurally.

Premedical education was emphasized by John Morgan when he was making plans for the first medical school in the United States. It was the concern of these Spaniards in their early creation of a medical curriculum. Four years of preparatory study in mathematics, physics, logic and metaphysics, to be carried out in the University or in any of the other colleges offering comparable courses leading to the

bachelor of arts degree, were required. Four additional years were necessary for the degree of bachelor of medicine. This was not the only medical degree, however, for there were the higher licentiate's degree and the still higher master's degree. To obtain them seven or eight years of study were required. All courses were given in Latin except anatomy and surgery, which were taught in Romance (the language of the people). The texts were the ancient authorities, all written five hundred years and more before. Instruction was didactic. Lectures consisted of a half hour of dictation followed by another half hour of explanation in Latin, or in Romance if the students failed to understand. In very much the modern manner we read of these Spanish professors lingering at the door of their class rooms after lectures to answer their students' questions and to expound some moot point.

The road to a medical career in early New Spain was not an easy one. Not only were there stiff premedical requirements and a four-year course to be hurdled, but other less usual barriers had to be surmounted. These were not new barriers, to be sure. They barred the road to medicine in all medieval universities. Flores, to whose account of Mexican medicine we are indebted, stated, hyperbolically perhaps, that "thousands of conditions" had to be met. Certainly there were too many to speak of more than a few here. A student had to be able to prove his legitimacy and his cleanness of blood, and he must be a good Catholic. Students must matriculate afresh each year and swear allegiance to the rector. They were required to live in honest houses and to wear simple clothes. They were forbidden to wear bordered shirts, silk hose, white or colored shoes. Ornaments of velvet or satin on their jackets, gloves and gold chains were all on the forbidden list. The privilege of wearing the Spanish collar, denied to other students, was granted to those matriculated in medicine, but the manner in which their hair should be combed was prescribed, and if they were caught carrying poniard, dagger or other arms, they were fined 50 pesos.

When, after his four years of study, the medical student in New Spain was prepared to receive the degree of bachelor of medicine, it was conferred with considerable pomp and circumstance. The examination proper took place in the great hall of the University, where "conclusions" previously announced were proposed and disputed before eight examiners and many dignitaries. Each of the eight examiners asked thirty-two questions on previously assigned reading. If the candidate passed this gruelling test he distributed gratuities, received the oath and made the vow with "AA and RR." Apprised of his success by the presiding official, he was brought forward by the beadles and arrayed in appropriate academic gown. The profession of faith, the swearing of loyalty to the statutes of the university, the promise to defend the virginity of Mary followed. He was now graciously invited to explain some obscure point in the writings of the ancients, but almost before he had begun he was mercifully interrupted and the ceremony ended. These graduation exercises were not crowned by the giving of diplomas. Not until two years of apprenticeship had been completed did the young bachelor receive his coveted reward. Practical instruction was thus made requisite to a license, and six years, not four, stood between matriculation and the right to practice.

The higher degree of licentiate in medicine was reserved for a bachelor of medicine who had had three years of postgraduate apprenticeship, and no run-in with the authorities. There must be no blot on his escutcheon, and no blood of slaves in his veins. He must be a Christian and the proud possessor of a library. The examination was more elaborate than the one just described. It began with the "noche triste" in which the candidate in an hour's oration defended a predetermined thesis and was answered by three previously appointed doctors or licentiates. On the next day at 6:00 a. m., the required fees having been paid, the examination began and lasted several hours. On still the next day, the carrying of weapons being forbidden, further arguments were made and answered at the house of the president. Gifts were then in order, the vow was taken, the result of the voting of the faculty announced and the candidate, if successful, ordered to appear the next day for the formal conferring of the degree. An academic parade of officers and faculty on horseback escorted him from his house with a fanfare of trumpets to the great chapel of the cathedral especially decorated for the occasion, where, seated in the midst of a distinguished company, he was created a licentiate.

As might be imagined, the degree of doctor of medicine, to which only licentiates were eligible, was even more difficult to obtain and the ceremony of conferring the degree even more elaborate. The horseback procession through

the streets was an important feature. The whole university joined in it, and now the noise of clarions and kettledrums was added to the blare of trumpets. A prominent place was assigned to a man-at-arms, who, bearing the yellow bonnet of the future doctor on a gilded staff, rode a well appointed horse. Bringing up the rear was the godfather of the candidate, usually a noble or gentleman of rank accompanied by two other gentlemen. On this and the next day the candidate displayed a banner bearing his armorial device. A second parade preceded the final ceremonies, which took place before the chancellor or viceroy, and consisted of several orations and the defense of a question in which the candidate and the officers of the university joined. The insignia of his eminent position were then conferred with an appropriate Latin sentence: first a kiss on the cheek,

"Accipe osculum pacis in signum fraternitatis, amicitiae et unionis cum Academia nostra."

Then a gold ring was put upon his finger,

"Accipe annulum aureum in signum desponsationis, et conjugii inter te et sapientiam, tanquam sponsam charissimam."

Then a book was placed in his hand,

"Accipe librum sapientiae, ut possis litere, et publice alios docere."

Then a gold sword was buckled on,

"Accipe ensem deauratum in signum militiae, non enim minus militant Doctores Medici morbos profligando, quam milites fortes inimicos superando."

With the assistance of his godfather his spurs were put on,

"Accipe calcaria aurea, nam quemadmodum equites hostiliter prorrumpunt in inimicos; ita Doctores adversus morborum catervam."

Finally he was led to the chair (proud moment!),

"Ascende in Cathedram, et sede in ea, ut tanquam Doctor Hippocratem et Galenum possis expendere, ac interpretari."

After taking the oath and giving another brief Latin oration, he knelt to receive the bonnet and the degree of doctor of medicine. Another Latin oration followed, gratuities and gloves were given his sponsors and professors, and the ceremony ended in a final procession back to his house, where, we presume, he was left in a state of complete exhaustion.

Under such a system of medical education many distinguished Mexican doctors were graduated in the Sixteenth and Seventeenth Centuries in New Spain. The earliest was one Pedro Lopez. One of the most outstanding was Augustin Farfan, who received his degree in 1567. He was the author of at least two works on medicine, one a pathological treatise called *Tractado de Medicina,* published in 1592, and another on therapy called *Libro de Curationes.**
There were other notable graduates such as Cardenas, Cisneros, Osorio, Diaz, Salgado, Guerra, Peredo, Flores, Brizuela, and Jose Ignacio Bartolache, who is said to have afterwards made brilliant contributions to phlebotomy.

Although the elaborate type of medical instruction outlined was offered by the university from its earliest days, no provision was made for the education of pharmacists, midwives and phlebotomists. Practical experience was all that was demanded of these lesser figures in the medical world. There was no chair of obstetrics. Although surgery of a sort was taught, it was a purely theoretical course, and real training in the art had to be got elsewhere. There were two orders of surgeons, the so-called "Latin surgeons," who had received the premedical education and gone through the regular course in medicine in the university, and there were the surgical practitioners known as the "Romanticista," who confined themselves to external remedies. It was not until 1768 that surgical teaching in Mexico was put upon a more satisfactory footing with the founding of the Royal College of Surgery by Don Pedro Virgili. We must pause to recall, however, that as early as 1525 one Francisco Soto, a barber surgeon, was granted authority (licensed) by the town council to teach medicine. This must have been the earliest medical teaching in Mexico and because of it we might say that Mexican surgery was the father of Mexican medicine and not the stepchild that the late founding of the Royal College of Surgery would make us believe.

The lack of practical instruction at the bedside in the early curriculum is to be regretted, since early Mexico was richly supplied with hospitals. There are records of no less than thirty-six founded in Mexico before 1600.

III

Small wonder that physicians in North America so little contemplate this early medical history of New Spain, and so little acknowledge her priority in things medical, for these beginnings of medical teaching to the south of us

*Five other medical works were published in Mexico during this century.

afford a singular contrast to the beginnings of medical education in North America proper and the points of unlikeness are more numerous than the points of likeness, and the real debt almost nil.

To begin with, the start was made by the Spaniards two hundred years before it was made by the English. One represents medieval medicine, one modern medicine. With full appreciation of Aztec medicine as they found it, the Spaniards appropriated much of it, building their medical teaching about it whenever possible. In contrast, our use of Indian medicine was meager and none of it influenced our medical teaching.

The form of medical teaching in New Spain followed exactly the form of medical teaching in the medieval universities. They were almost identical. In North America medical education began about the time that the English yoke was thrown off and synchronized with the birth of a republic. It was a plain republican type of education, repudiating all the frills and privileges associated with royalty.

Medical teaching in New Spain presupposed premedical schooling and the period of study was from four to eight years, in sharp contrast to our own early two-year courses of study based upon very sketchy preparation. On the other hand, the content of medical instruction in the United States of America was far superior to that given in the early days of medical teaching in Mexico. A new day of science was dawning, though faintly. Hippocrates, Galen and Avicenna had been dethroned and in their places were the *Anatomy* of Vesalius and the *Physiology* of Harvey. Defending a thesis was not what it had been, but familiarity with the human body was far more complete. Perhaps the gains were made at a sacrifice of some picturesque details, but such is ever the way of progress.

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DISCUSSION (*Abstract*)

Dr. Henry E. Sigerist, Baltimore, Md.—The medical achievements of the Spaniards in the colonies were truly remarkable. To have erected nine hospitals and several medical schools before 1600 was quite a record. When the University of Mexico was opened in 1553 as a daughter of Salamanca, all the chairs could be filled with colonists. Indians and Spaniards were admitted under the same conditions and enjoyed equal rights. That the career was not an easy one is made evident by the life and work of Juan de Cardenas on whom one of my students wrote a learned dissertation (W. Deuchler, Juan de Cardenas, Bern, Leipzig, 1930, 127 p.). Cardenas is known as the author of an interesting book, "Problemas y Secretos Maravillosos de las Indias," that was published in Mexico in 1591. He came to Mexico at the age of 26 and entered the University where, after four years of study, he graduated as a bachelor of arts. Two years later he received the degree of a bachelor of medicine, whereupon he worked in the Hospital of Guadalajara. It is only in 1590 that he graduated as doctor of medicine. Five years later, he applied for the chair, Prima de Medicina. There were four competitors and he failed to obtain it. In 1598 he competed for the chair, Temporal de Visperas de Medicina but failed again, and it was only in 1607 that he was appointed a professor in the Medical Faculty, two years before his death. The interest of Cardenas' book lies in the fact that it shows the difficulties that the Spanish scientists had to overcome in dealing with the natural history of the new world. Cardenas, like most Spanish scientists of that time, was an Aristotelian, and throughout his book he endeavors to reconcile his observations in Mexico with the Aristotelian doctrine. Until the end of the eighteenth century, the work of Hippocrates, Galen and Avicenna were the official text books at the University of Mexico. As late as 1824 the Aphorisms, the Prognostic and the Epidemics of Hippocrates were studied and interpreted, and it was only in 1824 that Bichat's works were introduced into the curriculum.

Dr. Lewis J. Moorman, Oklahoma City, Okla.—According to our best available information, medical education as initiated in New Spain in the sixteenth century conformed to that found in the universities of Europe at that time. Granting that this nucleus of medical education in New Spain was on an equal footing with that in other medieval universities, it failed directly to influence medical education in the United States. However, there is no doubt of certain indirect influences. In the sixteenth century Mexican medicine permeated Europe through Spanish influence. Many of the vegetable remedies of primitive Mexico and New Spain have been admitted to the United States Pharmacopeia.

The Medical School of the College of Philadelphia, now the University of Pennsylvania, was established in 1765. It was patterned after the University of Edinburgh and the latter after the University of Leyden. The University of Leyden goes back to the sixteenth century. It is reasonable to believe that the influences of New Spain trickled through and colored the teaching of Cullen at the University of Edinburgh. Cullen had the added stimulus of a trip to the West Indies after completing his apprenticeship in medicine. John Morgan and William Shippen, Jr., were pupils of Cullen and both received advice and instructions from him in connection with the proposed medical school in Philadelphia.

It is interesting to note the relative effects of medical education in Mexico and the United States. In Mexico, native inertia, naïve satisfaction with existing condi-

tions, including primitive medicine and the relative inaccessibility of a large percentage of the population living in small self-sufficient communities, have prevented the wide dissemination of the principles of modern medicine. It is true that this is perhaps largely due to certain topographical features of the country below the Rio Grande.

On the contrary, in the United States, there has been a ready acceptance of the benefits accruing from medical education, and even the aboriginal red men have laid down the "wampum belt" and pushed aside the "medicine man" to make way for legitimate medicine.

Dr. Hugh H. Trout, Roanoke, Va.—After reading Dr. Blanton's paper on "Medical Education in New Spain," I thought it might be interesting to ascertain whether any doctors came to America with Columbus, particularly to find out whether any of these doctors located in any parts of Virginia.

General Garrison and I, a few years ago, discussed the probability of a rumor that two doctors came to America with Columbus. These two doctors were supposed to have shipped as sailors and not doctors. The following information was obtained from "A History of the Jews in the United States," by Rabbi Lee J. Levinger, Ph.D., Department of Synagogue and School Extension of the Union of American Hebrew Congregations, Cincinnati, Ohio, and "The History of the Jews in America," by Peter Wiernik: The Jewish Press Publishing Company, New York.

A few students believed that Columbus was possibly of Jewish blood, though he has always been known as a Catholic. They said that no Spanish Jew could have ever expected aid from the King and Queen of Spain, so that Columbus claimed to be a Christian from Italy. Rabbi Levinger does not think that Columbus was a Jew. Columbus definitely made friends with Joseph Vecinho, who was court physician at Portugal, and also with his teacher, Abraham Been Samuel Zacato. Rabbi Levinger also shows that the closest Jewish friends of Columbus were two of his greatest backers in his first expedition, two Maranos of Spain, Luis de Santangel, Chancellor of the royal household, and Gabriel Sanchez, Chief Treasurer of Aragon.

It is easy to believe that Columbus, having these Jewish friends so close to the powers that be, "arranged" that these two Jewish doctors be given their choice of remaining in prison or sailing with him. It is not definitely known just exactly how many men were with Columbus, but, most authorities believe somewhere between 90 and 120. The two doctors were the surgeon, Marco, and the physician, Maestro Bernall. Bernall had "done penance" before the inquisition in 1490 as an adherent of Judaism. It is interesting to know that Bernall with a number of the other members of the expedition later engaged in a conspiracy against the Admiral, as Columbus was then called. It was only the firm friendship of Santagel that saved Columbus from complete disgrace. It is especially illuminating to realize that the first expedition had been paid for by Santagel, who was later repaid by the King. The second expedition was paid for by the king out of the confiscated money of the banished Jews, for even the debts that the Christians owed to Jews were taken over by the government for the benefit of the Royal Treasury.

I have been unable to find any further information about either Marco or Bernall, but have no reason to believe that either of them remained in America.

The fact, as brought out by Dr. Blanton, that there has been very little, if any, influence in southwest America on the medical education from "New Spain" rather correlates with the fact that apparently neither of these doctors who came over with Columbus left any impression on medical progress in the United States.

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DIAGNOSIS OF DRUNKENNESS

With the repeal of the prohibition laws, the number of arrests for driving an automobile while intoxicated seems to be increasing. The penalty is and should be heavy, and the diagnosis is often disputed. A reliable test for inebriation would be a boon to law enforcement. The most quoted method depends upon measurement of the concentration of ethyl alcohol in the blood. The blood alcohol may be chemically determined as the blood sugar, nitrogen, and uric acid have been for many years, and certain concentrations of blood alcohol have been held, for medicolegal purposes, to denote intoxication.

In recent studies of Newman and Card,[1] of the Division of Neuropsychiatry of Stanford University, on experimental alcoholism, the blood alcohol and the behavior of drunkard dogs were studied, with some interesting results. The animals were given 6-7 c. c. per kilogram of body weight of ethyl alcohol daily for more than a year, following which they were considered addicts. They had developed an increased tolerance for this stimulant in comparison with controls which had received no alcohol. They appeared to "carry their whiskey better" than the non-addicts. The two groups, the habituées and the total abstainers, were then each given the same amount of alcohol intravenously, the blood alcohol was measured at intervals over a period of seven hours, and curves of alcohol concentration were plotted. This is an alcohol tolerance test similar to the well-known sugar tolerance test. Rather surprisingly, the curves of the two groups coincided. The blood alcohol of the addicts was not lower than that of the dogs which were unaccustomed to alcohol. Alcohol was not removed from or destroyed in the blood of the habituées any faster than in the blood of the non-alcoholics. If tolerance had developed, it was concluded that it must be a tissue tolerance.

The behavior of the two groups of animals was quite different. The motor coordination of the drinkers was much better than of those which were unaccustomed to the stimulant. This was determined by having the animal attempt to climb stairs. Some climbed readily after taking a considerable amount of alcohol; some could not ascend at all, and this was in no direct relation to the concentration of alcohol in the blood. The blood level was in proportion to the quantity taken and the time which had elapsed; but a dog with a blood alcohol of 375 milligrams per 100 c. c. might climb the stairs very well, while another at the same concentration was in a state of coma.

The habituées maintained much better motor coordination than the non-drinkers. However, different dogs, regardless of the degree of habituation, showed muscular incoordination at very different blood alcohol levels; there was considerable individual variation in susceptibility even before the animals had become accustomed to drinking. Acquired tolerance was lost after the alcoholic dogs were kept for seven months without this stimulant; their steps were then as uncertain under the influence of alcohol as those of the dogs which had never become habituated.

The observations on dogs, according to the California authors, are in accord with a few on men. Their significance in relation to the chemical diagnosis of drunkenness, it is suggested, must be considered. With the dogs, the blood alcohol was not a reliable index of neuromuscular coordination, nor presumably of the degree of intoxication. If the above work is confirmed, one might conclude that for police court diagnosis a motor control test, such as saying Massa-

1. Newman, Henry; and Card, John: Duration of Acquired Tolerance to Ethyl Alcohol. Jour. Pharmacol. & Exper. Ther., 59:249 (March) 1937.

chusetts, walking a chalk line, putting keys in holes, or some variety of visual acuity test, may be more dependable than a blood alcohol estimation. The chemical test proves that alcohol has been imbibed, not that the individual is "drunk."

SODIUM AND POTASSIUM IN ADDISON'S DISEASE

Ordinary table salt is required in very large quantities in adrenal deficiency. Harrop[1] has suggested a clinical diagnostic test for Addison's disease, depending upon a sudden restriction of salt in the patient's dietary. The individual is hospitalized and maintained for five days on a low salt ration, which precipitates a crisis in Addison's disease. The ingestion of large amounts of salt was prescribed long before the discovery of the hormone, and it may arrest symptoms over a considerable period. In dogs it does not relieve them permanently, according to Wilder, Kendall, Snell, Kepler, Rynearson and Adams,[1] of Rochester, because more sodium ion than chlorine ion is required, and table salt provides the two in equal quantity. If sodium bicarbonate or citrate is supplied, as well as sodium chloride, adrenalectomized dogs may be kept in good condition indefinitely.[1] Patients also do well for a time if this salt requirement is observed; they eventually, however, develop crises and require administration of adrenal cortex.

After consumption of such vegetables as potatoes, which have a high potassium content, one naturally craves salt. Sodium and potassium ions are antagonistic in their action on muscle outside the body or within, and potassium may at times be quite toxic. According to the Rochester workers,[1] potassium metabolism is seriously at fault in adrenal deficiency, and potassium may be quite poisonous to these patients. If the patient's sodium chloride intake is restricted, the urinary excretion of the two elements is diminished, but there is no other pronounced change. If the potassium intake is increased, there is an immediate rise of sodium and chlorine excretion, and if these elements are simultaneously reduced in the dietary, the patient becomes weak and ill. Potassium rises in the blood of dogs after adrenalectomy, and its concentration just before death is equal to that of an animal which is dying of potassium poisoning. In human beings with Addison's disease potassium is elevated in the blood to 21 to 49 milligrams per cent from the normal of 15 to 20 milligrams. The patient is extremely sensitive to this mineral, which fact should be recalled in any attempt to regulate treatment. Potassium should be carefully restricted. It should be recalled, however, that a diet low in this element is apt to be low also in calcium, phosphorus, iron and vitamins B and G, which must be supplied.[1]

According to Katz and Katz,[2] of Tulane, potassium is one of the minerals which stimulates secretion of epinephrine. Epinephrine, of course, in turn stimulates the mobilization of sugar into the blood. According to Britton and Silvette,[3] of the University of Virginia, the essential change after adrenalectomy is in carbohydrate metabolism rather than in sodium chloride. More than half the body carbohydrate, they say, disappears after adrenalectomy, while sodium chloride is reduced after many different abdominal operations.

The literature demonstrates the exceeding complexity of adrenal effects.

GLEANINGS FROM RECENT JOURNALS

Vitamin A and a Neoplasm. — Prolonged chronic vitamin deficiencies, rather than the death-dealing total deficiency, are receiving increasing attention in nutritional laboratories. In total deficiency of vitamin A, drying of the eye or xerophthalmia develops and usually the individual soon dies. There are many tissue changes in chronic vitamin A insufficiency.

This vitamin is said to control epithelial tissues. The various tests for insufficiency are of interest as showing its influence over different body structures. One of these is the test for night blindness. In mild deficiency, through some pathologic alteration, the visual purple of the eye does not function properly. Another test depends upon the vaginal smear. The cells of the vagina of small animals are cornified in A deficiency.

According to May Mellanby, A is the most

1. Wilder, Russell M.; Kendall, Edward C.; Snell, Albert M.; Kepler, Edwin J.; Rynearson, Edward H.; and Adams, Mildred: Intake of Potassium, an Important Consideration in Addison's Disease: A Metabolic Study. Arch. Int. Med., **59**:368 (March) 1937.

2. Katz, Gerhard; and Katz, Gertrud: Action of Potassium Chloride and Calcium Chloride on Adrenals of the Cat. Jour. Pharmac. & Exper. Ther., **59**:284 (March) 1937.

3. Britton, S. W.; and Silvette, H.: A Comparison of Sodium Chloride and Carbohydrate Changes in Adrenal Insufficiency and Other Experimental Conditions. Amer. Jour. Physiol., **118**:584 (March) 1937.

important vitamin in tooth development. In prolonged A deficiency of the rat, various abnormalities, particularly of the incisor teeth, have been demonstrated. Yale workers[1] have maintained the animals from the age of two weeks for more than a year, with symptoms of vitamin A deficiency.

They received a fraction of an international unit per day, according to their individual requirement. In less than two months on the dietary, the incisor teeth showed characteristic alterations in color and form. Lumps developed in the maxillae. There were tumors from the pulp of the teeth, odontomas, in the majority of the rats.

This is the first instance that can be brought to mind of experimental production of nutritional tumors. New growths have been produced by injury and irritation, but not by dietary measures.

Anthropology and Psychology. — Studies of unwritten history have assumed an important place in modern culture. Such sciences as archaeology and anthropology, which usually skip the documented past to investigate and interpret records dug from the earth or gleaned from uncivilized peoples, have attracted much recent interest. Anthropology, or the science of man, usually connoting primitive man, is concerned in all modern problems, and at times may be especially enlightening to the experimental psychologist. The work of Unwin[2] is a painstaking and laborious comparison of types of architectural achievement with tribal mating customs. After ten years of research, the author concludes that among simple races the complexity of the dwellings, temples and other public buildings is in proportion to the degree of sexual restraint which their laws impose. With sexual promiscuity there is a low development of architecture; and construction increases with sexual control. This would seem worthy of consideration in comparison with the concept of psycho-analysts beginning with Freud, that sexual repression was a common cause of certain forms of insanity and might be dangerous. With primitive races apparently repression was sublimated in building and was necessary for the appearance of more difficult types of achievement.

Post-Lumbar Puncture Headaches.—According to Heldt and Whitehead,[1] of the Henry Ford Hospital in Detroit, the violent headaches which frequently follow lumbar puncture may be prevented by filling the puncture hole with catgut as the needle is withdrawn, by a technic which is described.

Quantity of Antirachitic Vitamin for Intoxication.—Even so harmless a substance as a vitamin may be injurious if taken in sufficient amount. The optimum dosage of D is still a matter of some uncertainty. Hypervitaminosis D produces cellular injury, and calcium deposition with weight loss; however, intoxication for short periods according to Chicago investigators[2] does not result in permanent ill effects. These workers report that 20,000 units of vitamin D per kilogram of body weight given to dogs and humans over indefinite periods produced no signs of injury. For a seventy kilo man this would amount to nearly a million and a half units per day, and seems an enormous quantity. From natural foods one may assume that there is no possibility of overdosage. Even with concentrated products the antirachitic and the toxic dose should be far apart.

1. Orten, O. U.; Burn, C. G.; and Smith, A. H.: Effects of Prolonged Chronic Vitamin A Deficiency in Rats, with Special Reference to Odontomas. Proc. Soc. Exper. Biol. & Med., **36**: 82 (Feb.) 1937.

2. Unwin, J. D.: Sex and Culture. London: Humphrey Milford, Oxford University Press, 1934.

TWENTY-FIVE YEARS AGO

From Journals of 1912

Eclampsia.[3]—"The progressive nature [of eclampsia] clearly indicates the necessity of prompt emptying of the uterus, particularly after the onset of the convulsions * * * repeated seizure is a compelling indication for immediate action. * * * Three successful cesarean sections for eclampsia in three successive pregnancies of the same patient. * * * When Halbertsma, in 1890, at the International Medical Congress at Berlin, advocated cesarean section as the universal remedy for eclampsia, without regard to medical treatment, the announcement created a sensation. * * * In 1897, Kellitz * * * collected twenty-eight cases of cesarean section for eclampsia. Fourteen mothers died (50 per cent)

1. Heldt, T. J.; and Whitehead, L. S.: Clinical Studies in Postlumbar Puncture Headaches. Amer. Jour. Psychiat., **93**: 649 (Nov.) 1936.

2. Stack, I. E.; Deutch, H.; Reed, C. I.; and Struck, H. C.: Further Studies on Intoxication with Vitamin D. Ann. Int. Med., **10**:951 (Jan.) 1937.

3. Moran, John F.: Indications for Abdominal Cesarean Section in Eclampsia. Sou. Med. Jour., **5**:338, 1912.

and eighteen infants were stillborn or succumbed shortly after birth (62 per cent). * * * To delay until the patient is *in extremis* and all other treatment has failed, is to invite disaster."

Pellagra not Contagious.[1]—"There is far more evidence of every kind that malarial conditions are contagious (and no one even suspects malaria of being contagious) than that such is the case with pellagra. * * * Unfortunately we have led people to consider the disease incurable, when such a thing as an incurable disease does not exist—if recognized in time. The evidence all goes to prove that pellagra is caused by something in damaged maize. That points the way to avoid and treat it. Just quit eating imported corn or using corn products from abroad. *Verbam sat.*"

Medical Education in the South.[2]—"Mr. Abraham Flexner's report on medical education in the United States and Canada revealed a shocking condition of affairs in the medical colleges of the South. Not even the most mercenary business colleges, apparently, have fallen quite so low as the worst of our cheap and proprietary medical schools. * * * This report did indeed show medical education in the South at a very low ebb, but not lower, however, than in some other parts of the country, such as in Illinois.

"The Flexner treatment is nothing less than heroic, since he thinks six schools are sufficient to meet the needs of the South. * * * Since the publication of this report, two years ago, five colleges have disappeared. * * * Without endowment, no independent medical school may hope long to survive. Medical colleges having good locations, such as Birmingham, Memphis, Atlanta, Richmond or Little Rock, should appeal to men of wealth for endowment. * * * During the past seventy-five years hundreds of millions of dollars have been given for the endowment of universities and colleges, and of technical schools, but how trifling and miserable the sum given for the endowment of the colleges on which the very life and health and happiness of millions of people depend. * * * When investigations have proved that it costs easily $10,000 per year to conduct any one of the scientific departments of the first two years of medical education in satisfactory fashion, and that it requires $50,000 to $60,000 per year to maintain the work of the first two years, we are forced to believe that the ten medical colleges in the South now having a combined annual income of $26,285, or an average of $2,628 each, have little hope of securing adequate funds, and they should retire from the field of medical education. * * *

"Permit me now to turn to the problem of entrance requirements in the South. There is, to quote President Pritchett, 'no excuse whatsoever for the almost utter absence of standards which is characteristic of that section.'"

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2. Editorial: Sou. Med. Jour., **5**:430, 1912.

3. Craighead, Edwin B. (President Tulane University, New Orleans): Medical Education in the South. J.A.M.A., **58**:726, 1912.

Book Reviews

The Clinical Use of Digitalis. By Drew Luten, A.B., M.D., Associate Professor of Clinical Medicine in the Washington University School of Medicine and Physician to Barnes Hospital, St. Louis. 226 pages. Springfield, Illinois: Charles C. Thomas, 1936. Cloth $3.50.

Digitalis has been used by clinicians for a century and a half but it is still not employed in a manner which will give the best results by the majority of physicians. Until comparatively recent years responsibility for the misuse of the drug could be laid at the door of the pharmaceutical houses, as many of the preparations of digitalis which were available were either impotent or of variable and unknown strength. This situation no longer exists. Almost all of the solid preparations of digitalis on the market are now highly efficacious and the inability of the physician to achieve satisfactory results with this drug can be ascribed only to his own shortcomings. The tincture of digitalis is still widely used despite its numerous disadvantages, and except in those rare instances where drugs have to be withheld by mouth, the pills, capsules and tablets of the powdered leaves should be used. Another serious error in digitalis therapy is based on the misconception still widely prevalent in Great Britian and to a lesser extent in this country, which holds that the drug is only of value in patients with auricular fibrillation. The failure to use it in persons with regular rythm has probably been responsible for the death of many hundreds of persons from acute pulmonary edema. An equally serious mistake has been the indiscriminate use of a drug which acts only on the heart in persons suffering from peripheral circulatory failure where it cannot possibly be of benefit and is often actually harmful.

Dr. Luten's book combats these and other prevalent misconceptions in regard to digitalis. It is a useful volume, clearly written, readily understandable and containing specific information about the drug. The author steers a middle ground between the homeopathic doses of the tincture which are usually employed by practitioners and the unusually large doses of the leaf frequently used in hospitals. The book can be highly recommended in its practical aspects. There are some flaws in the author's presentation of the mechanism of digitalis action. However, this does not detract from a volume which is intended primarily as a practical guide.

The Management of Obstetric Difficulties. By Paul Titus, M.D., Obstetrician and Gynecologist to the St. Margaret Memorial Hospital, Pittsburgh; Consulting Obstetrician and Gynecologist to the Pittsburgh City Holmes and Hospital, Mayview, and to the Homestead Hospital, Homestead, Pa.; Secretary of the American Board of Obstetrics and Gynecology. 879 pages, illustrated. St. Louis: The C. V. Mosby Company, 1937. Cloth $8.50.

For those who know the saneness and good judgment of Dr. Titus the practical suggestions in this book will have particular weight. The book, as the title suggests, is not a conventional textbook and the fundamentals of obstetrics, including physiology, and normal pregnancy and labor, are omitted. The aim of the author is to furnish a working aid in dealing with obstetric difficulties, and it is written with the general

practitioner, hospital resident and others interested in abnormal phases of obstetrics in mind.

The book is practical and specific in its recommendations as to treatment. Instead of merely advising that a patient suffering from nausea of pregnancy be given minute directions in regard to diet, the minutiae are presented in the form of a daily food schedule. The author's advice as to what to tell a patient in the face of an apparently absolute sterility shows that he does not forget the woman in his interest in the case.

Believing that obstetrics and gynecology are inseparably associated and that any person specializing in either should have a fundamental knowledge of the other, Dr. Titus includes in this book such subjects as sterility and its treatment, pelvic floor trauma and postpartum uterine misplacements. In condemning manual dilatation of the cervix he differs from many obstetricians who in suitable cases believe this the safest means of forced dilatation. When postpartum bleeding is due to cervical tears as soon as the torn edges have been clamped he advises packing the uterine cavity to prevent further bleeding from that source. Unless uterine atony is also present this would not seem necessary nor desirable. In the discussion of postpartum hemorrhage no mention is made of the newer oxytocics which may be given intravenously. Routine inspection of the cervix following delivery is not advocated, nor is repair advised for shallow lacerations. This book is one which will be of unusual interest and value to anyone actively engaged in the practice of obstetrics.

Heart Disease. By Paul Dudley White, M.D., Lecturer in Medicine, Harvard Medical School; Physician to the Massachusetts General Hospital, Boston. Second Edition. 744 pages, illustrated. New York: The Macmillan Company, 1937. Cloth $7.50.

This is the second edition of a popular volume. The book is divided into four parts, the first dealing with methods of examination, the second with etiology, the third with pathology, and the fourth with disturbances of function. The book as a whole is one of the best ever written on the heart. Although special methods of examination are by no means neglected the emphasis throughout is wisely placed on the information obtained by the history and physical examination. The volume is unusually comprehensive and omits few points which are of practical value in the management of cardiac disease. There is naturally little room for discussion of the more fundamental phases of the disturbed function of the heart under abnormal conditions. Even here however, in brief descriptions of the mechanism of heart failure, the information presented is accurate and in keeping with the recent advances in this field. This, the second edition, has been entirely revised and is in the reviewer's opinion a decided improvement on the first. It is an eminently practical book and it can be recommended to students, practitioners and internists.

Southern Medical News

ALABAMA

The Northeastern Division of the Alabama Medical Association met in Gadsden, February 16.

Dr. Roy E. Butler, formerly of New Orleans, Louisiana, has moved to Mobile.

Dr. David Joe Wilson and Miss Margaret Lewis Rosenau, both of Athens, were married recently.

Dr. William J. Weatherford, Uriah, and Miss Rachel Milner were married November 10.

Dr. Henderson L. Holman, Ozark, and Miss Floride Arwood were married December 18.

Dr. James Cobb Laslie, Tuskegee, and Miss Martha Virginia Johnson were married recently.

Deaths

Dr. Ralph Douglas Porch, Sylacauga, aged 53, died December 27.

Dr. Samuel Edwards, Tuscaloosa, aged 65, died December 30 of coronary thrombosis.

Dr. Walter Miller, Fort Payne, aged 52, died February 27.

Dr. H. D. Loflin, Troy, aged 55, died recently.

Dr. Thomas J. Wilkinson, Athens, aged 66, died recently.

Dr. C. L. Cork, Tuscaloosa, aged 58, died recently.

ARKANSAS

The Arkansas County Medical Society has elected the following officers for the coming year: Dr. C. A. Lumsden, DeWitt, President; Dr. E. B. Swindler, Stuttgart, Vice-President; Dr. C. W. Rasco, Jr., DeQueen, Secretary-Treasurer.

The Bradley County Medical Society has elected the following officers for the coming year: Dr. M. T. Crow, Warren, President; Dr. L. E. Ellison, Warren, Vice-President; Dr. W. J. Hunt, Warren, Secretary-Treasurer.

The Chicot County Medical Society has elected the following officers for the coming year: Dr. B. C. Clark, Lake Village, President; Dr. J. H. Burge, Lake Village, Vice-President; Dr. W. J. Schwarz, Lake Village, Secretary-Treasurer.

The Fort Smith Clinical Society has elected the following officers for the coming year: Dr. A. F. Hoge, President; Dr. J. A. Foltz, Vice-President; Dr. E. C. Molton, Secretary-Treasurer.

The Phillips County Medical Society has elected the following officers for the coming year: Dr. George R. Storm, Helena, President; Dr. H. H. Rightor, Helena, Secretary-Treasurer.

The Randolph County Medical Society has elected the following officers for the coming year: Dr. W. E. Hamil, Pocahontas, President; Dr. J. W. Brown, Pocahontas, Vice-President; Dr. William O. Loftis, Pocahontas, Secretary-Treasurer.

The Searcy County Medical Society has elected the following officers for the coming year: Dr. J. A. Henley, Marshall, President; Dr. J. O. Cotton, Leslie, Vice-President; Dr. Sam G. Daniel, Marshall, Secretary-Treasurer.

The Sevier County Medical Society has elected the following officers for the coming year: Dr. C. C. Hanchey, DeQueen, President; Dr. C. E. Kitchens, DeQueen, Vice-President; Dr. G. L. Kimball, Secretary-Treasurer.

Dr. Joe Roe, Little Rock, has been made a member of the State Hospital Board.

Dr. R. A. Law, Little Rock, has been made Vice-President of the Christ Church Men's Club of that city.

Dr. N. E. Murphey, Clarendon, has been made Division Surgeon for the Cotton Belt Lines at Clarendon.

Dr. Joe F. Shuffield, Little Rock, has been made a member of the Arkansas Game and Fish Commission.

Dr. J. W. Harper, El Dorado, has been made a Director of the Chamber of Commerce of that city.

Dr. H. E. Mobley has been made President of the Morrilton Federal Savings and Loan Association.

Deaths

Dr. Bernie F. Jungkind, Beebe, aged 54, died December 15 of epithelioma of the nasopharynx.

Dr. B. P. Kimbro, Monticello, aged 72, died December 28 of carcinoma of the colon.

Dr. Robert N. Henry, Lake Village, aged 68, died January 4 of arteriosclerosis.

Dr. Luke Parker, DeValls Bluff, aged 63, died January 21 of cerebral hemorrhage.

DISTRICT OF COLUMBIA

Dr. Arthur C. Christie, Washington, has been made an honorary member of the German Society of Roentgenologists.

Dr. Lewis H. Taylor, Washington, has been made President of the Sibley Memorial Hospital.

The George Washington University School of Medicine, Washington, held its Fifth Annual Postgraduate Clinic on February 20.

Deaths

Dr. Thomas Jefferson Griffith, Washington, aged 85, died December 4.

Dr. Thomas Linville, Washington, aged 63, died February 1.

FLORIDA

The Brevard County Medical Society has elected the following officers for the coming year: Dr. W. C. Page, Cocoa, President; Dr. G. E. Cristie, Titusville, Vice-President; Dr. Bob Schlernitzauer, Rockledge, Secretary-Treasurer.

The Broward County Medical Society has elected the following officers for the coming year: Dr. G. S. McClellan, Pompano, President; Dr. B. F. Butler, Hollywood, Vice-President; Dr. O. C. Brown, Ft. Lauderdale, Secretary-Treasurer.

The Duval County Hospital Staff has elected the following officers for the coming year: Dr. Robert B. McIver, Jacksonville, President; Dr. Clayton E. Royce, Jacksonville, Vice-President; Dr. T. M. Palmer, Jacksonville, Secretary.

The Florida Midland Medical Association has elected the following officers for the coming year: Dr. C. W. Larrabee, Bradentown, President; Dr. Leland F. Carlton, Tampa, First Vice-President; Dr. W. C. McConnell, St. Petersburg, Second Vice-President; Dr. B. H. Sanchez, Plant City, Secretary-Treasurer.

The Jackson County Medical Society has elected the following officers for the coming year: Dr. C. H. Ryals, Grand Ridge, President; Dr. D. A. McKinnon, Marianna, Vice-President; Dr. Lewis Pierce, Marianna, Secretary-Treasurer.

The Monroe County Medical Society has elected the following officers for the coming year: Dr. Harry C. Galey, Key West, President; Dr. William R. Warren, Key West, Secretary.

The Pasco-Hernando-Citrus County Medical Society has elected the following officers for the coming year: Dr. W. Wardlaw Jones, Dade City, President; Dr. S. C. Harvard, Brooksville, First Vice-President; Dr. George A. Dame, Inverness, Second Vice-President; Dr. G. R. Creekmore, Brooksville, Secretary-Treasurer.

The Polk County Medical Society has elected the following officers for the coming year: Dr. R. E. Gilbert, Winter Haven, President; Dr. S. A. Lindsay, Fort Meade, Vice-President; Dr. J. R. Boulware, Lakeland, Secretary-Treasurer.

Dr. C. C. Collins, Jacksonville, has been made Chairman of the Duval County Board of Public Instruction.

Dr. Kenneth Phillips, Miami, has been made American Secretary to the Medical Association of the International Clinic.

Dr. Frank L. Quillman, Orlando, has been made full time County Physician and Health Officer of Orange County.

Dr. Lawrence A. Klein, formerly of Osceola, has moved to Live Oak.

Dr. Thomas F. McDaniel, formerly of Sebring, has moved to Sanford.

Deaths

Dr. George Longhead Eyster, Coral Gables, aged 83, died January 11 of uremia, obstruction of the right ureter and pyonephrosis.

Dr. Urban Grant Iles, Orlando, aged 72, died December 21 of coronary sclerosis, pernicious anemia and arteriosclerosis.

Dr. Jay Harvey Durkee, Jacksonville, aged 66, died December 29.

Dr. Joseph Franklin Ruff, Clearwater, aged 63, died December 7 of coronary thrombosis and paralysis agitans.

Dr. William J. Ebert, West Palm Beach, aged 50, died February 2 of coronary thrombosis.

Dr. J. Harrison Hodges, Gainesville, aged 71, died February 3.

GEORGIA

The Burke County Medical Society has elected the following officers for the coming year: Dr. W. R. Lowe, Midville, President; Dr. W. W. Hillis, Sardis, Vice-President; Dr. E. A. Bargeron, Waynesboro, Secretary-Treasurer.

The Clayton-Fayette Counties Medical Society has elected the following officers for the coming year: Dr. J. R. Wallis, Lovejoy, President; Dr. H. D. Kemper, Jonesboro, Vice-President; Dr. T. J. Busey, Fayetteville, Secretary-Treasurer.

The Crisp County Medical Society has elected the following officers for the coming year: Dr. A. J. Whelchel, Cordele, President; Dr. Charlie Adams, Cordele, Vice-President; Dr. L. O. Wooten, Cordele, Secretary-Treasurer.

The Franklin County Medical Society has elected the following officers for the coming year: Dr. Stewart D. Brown, Royston, President; Dr. B. T. Smith, Carnesville, Secretary-Treasurer.

The Habersham County Medical Society has elected the following officers for the coming year: Dr. Horace E. Crow, Alto, President; Dr. D. T. Rankin, Alto, Vice-President; Dr. David H. Garrison, Clarkesville, Secretary-Treasurer.

The Houston County Medical Society has elected the following officers for the coming year: Dr. J. W. Story, Perry, President; Dr. H. E. Evans, Perry, Vice-President; Dr. R. L. Cater, Perry, Secretary-Treasurer.

The Jackson-Barrow Counties Medical Society has elected the following officers for the coming year: Dr. W. T. Randolph, Winder, President; Dr. Oliver Pittman, Commerce, Vice-President; Dr. C. B. Lord, Jefferson, Secretary-Treasurer.

The Jenkins County Medical Society has elected the following officers for the coming year: Dr. H. G. Lee, Millen, President; Dr. Q. A. Mulkey, Millen, Vice-President; Dr. Cleveland Thompson, Millen, Secretary-Treasurer.

The Wayne County Medical Society has elected the following officers for the coming year: Dr. T. G. Ritch, Jesup, President; Dr. J. T. Colvin, Jesup, Vice-President; Dr. A. J. Gordon, Jesup, Secretary-Treasurer.

The Wilkes County Medical Society has elected the following officers for the coming year: Dr. C. E. Wills, Washington, President; Dr. H. M. Sale, Sharon, Vice-President; Dr. A. W. Simpson, Washington, Secretary-Treasurer.

The Georgia Baptist Hospital Staff has elected the following officers for the coming year: Dr. W. S. Dorough, President; Dr. Olin S. Cofer, First Vice-President; Dr. Stephen T. Brown, Second Vice-President; Dr. Thomas P. Goodwyn, Secretary; all of Atlanta.

Dr. D. C. Kelley, Lawrenceville, has been made President of the First National Bank of that city.

Dr. Samuel F. Rosen, Savannah, has been made a Fellow in the American College of Physicians.

Dr. W. H. Perkinson, Marietta, has been made Chairman of the Board of Education of that city.

Dr. Thomas Bolling Gay, Atlanta, has been made Chairman of the Fulton County Board of Health.

Dr. Bomar A. Olds and Dr. Lester A. Brown, Atlanta, have become associated for the practice of diseases of the ear, nose and throat.

Dr. Dixon Fowler, Atlanta, has opened offices in the Medical Arts Building.

Dr. Lewis Beason, formerly of Butler, has moved to Fort Gaines.

Dr. Kennon Christian Walden, Waycross, and Miss Anne Lilbourne Gravatt were married recently.

Deaths

Dr. Lamartine Griffin Hardman, Commerce, aged 60, died February 18 of arteriosclerosis.

Dr. Daniel H. Meeks, Nicholls, aged 61, died January 5.

Dr. Lee Bird, Rock Springs, aged 61, died January 11.

Dr. John Jackson Johnson, Calhoun, aged 30, died recently from injuries received in an automobile accident.

Dr. Leon Colquitt Ward, Damascus, aged 61, died January 31.

KENTUCKY

Dr. Edwin J. Palmer, formerly of East Gardner, Massachusetts, has moved to Clay.

Deaths

Dr. Obed Cooley, Lexington, aged 67, died January 20 of lobar pneumonia.

Dr. George W. Moore, Ashland, aged 78, died December 24 of myocarditis and chronic bronchitis.

Dr. Jesse J. Adams, Glasgow, aged 70, died January 6 of heart disease.

Dr. Jesse Lee Russell, Adairville, aged 51, died December 23 of heart disease.

Dr. Redmond O. Davis, Princeton, aged 68, died December 23 of cirrhosis of the liver.

Dr. Oscar Francis Shewmaker, Louisville, aged 53, died December 20 of heart disease.

Dr. Henry G. Sandlin, Richmond, aged 67, died December 20.

Dr. Robert Lovell Samuel, Maysville, aged 48, died December 11.

LOUISIANA

Dr. Lucien A. LeDoux, New Orleans, has been made General Chairman for the Southern Medical Association meeting in New

Continued on page 34

FORECAST WITH RADIOGRAPHS

PREGNANCY generally is considered a normal function. But when anatomical abnormalities exist or develop, Nature alone cannot be depended upon to effect a safe birth. Specific prenatal information about the individual case then is necessary to forecast possible complications and facilitate intelligent assistance or intervention.

Radiography provides an accurate, tangible anatomical portrayal of both mother and fetus. Many of the desired facts can only be surmised from other means of investigation. Radiographs are practically essential in:

1. Measuring pelvic diameters; demonstrating the type and formation of the pelvis.
2. Recognizing single or multiple pregnancies, abnormalities, fetal position.
3. Determining cardinal diameters of fetal skull to estimate disproportion between the volume of the head and pelvic capacity.
4. Differentiating between pregnancy and other abdominal enlargements.

There is a justifiable application of radiography in every pregnancy. In fact, close coöperation between the attending physician and a competent radiologist tends to simplify the ordinary problems of childbirth and to reduce both maternal and infant mortality. Eastman Kodak Company, *Medical Division*, Rochester, N. Y.

RADIOGRAPHS PROVIDE DIAGNOSTIC FACTS

George Washington University School of Medicine

WASHINGTON, D. C.

offers to graduates in medicine an intensive course in OPHTHALMOLOGY

May 31st to June 6th, 1937

GUEST MEMBERS

Drs. Clyde A. Clapp, Baltimore; Arthur J. Bedell, Albany; Edmund B. Spaeth, Philadelphia; P. Chalmers Jameson, Brooklyn; Edward Jackson, Denver; Harry S. Gradle, Chicago; Sanford R. Gifford, Chicago; S. Judd Beach, Portland, Me.; S. Hanford McKee, Montreal; Robert Von der Heydt, Chicago; LeGrand H. Hardy, New York; Walter B. Lancaster, Boston; Conrad Berens, New York; David B. Kirby, New York.

RESIDENT MEMBERS

Drs. Wm. Thornwall Davis, Ernest Sheppard, G. Victor Simpson, E. Leonard Goodman, Benjamin Rones, Ronald A. Cox, George B. Jenkins.

Col. J. E. Ash, Major Frederic Thorne, Capt. R. F. Bradish and Capt. Elbert DeCoursey of the Army Medical Center and Army Medical Museum.

Fee $40.00

Apply to the Secretary: Miss Louisa G. Wells, 927 17th Street, N. W. Washington, D. C.

Harvard Medical School

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INTERNAL MEDICINE— DIAGNOSIS AND TREATMENT

June 21-July 31 (6 weeks). Massachusetts General Hospital. Fee, $200.

MODERN DIAGNOSIS AND TREATMENT OF HEART DISEASE

July 1-31. Peter Bent Brigham Hospital. Fee, $150.

PEDIATRICS

July 1-31. Fee, $125.

CARDIOLOGY ADVANCED CARDIOLOGY

Cardiology, August. Advanced Cardiology, September. Fee, $150 per course.

For further information regarding the above courses apply to the Assistant Dean, Courses for Graduates Harvard Medical School, Boston, Massachusetts

Continued from page 450

Orleans, November 30-December 1-2-3, having been appointed recently by Dr. James T. Nix, President of the Orleans Parish Medical Society.

The New Orleans Graduate Medical Assembly held its first meeting in New Orleans March 8-11.

The Fifth District Medical Society has elected the following officers for the coming year: Dr. C. P. Gray, Jr., Monroe, President; Dr. Ralph King, Winnsboro, Vice-President; Dr. R. M. Simonton, Monroe, Secretary-Treasurer.

Dr. George J. Taquina, New Orleans, has been made Professor and Head of the Department of Otorhinolaryngology, Louisiana State University Medical Center.

Dr. Gabriel Steiner, formerly of Heidelberg University, Germany, is now at the Louisiana State University Medical Center where he is affiliated with the Department of Pathology.

Dr. Theodore L. Perrin, formerly of Boston, Massachusetts, has moved to New Orleans.

Dr. Roy E. Butler, formerly of New Orleans, has moved to Mobile, Alabama.

DEATHS

Dr. Almon Nathan Pierce, Lake Charles, aged 77, died December 2 of injuries received in an automobile accident.

MARYLAND

Dr. Harry S. Eagle, Baltimore, has received the Alvarenga Prize for 1936, awarded by the American College of Physicians, for his essay on "The Present Status of the Blood Coagulation Problem."

DEATHS

Dr. George Lewis Wetzel, Union Mills, aged 50, died December 22 of cardiorenal disease.

MISSISSIPPI

Dr. Charles R. Gillespie, Natchez, has been made Health Officer of Adams County.

Dr. J. C. Pegues, formerly of Greenville, has moved to Oklahoma City, Oklahoma.

Dr. A. G. LeRoy, Booneville, and Miss June Beene were married recently.

Dr. Kutchen T. Klein, Meridian, and Miss Thelma Weatherford were married December 30.

DEATHS

Dr. Elijah David Boozer, Greenwood Springs, aged 53, died in January of pneumonia.

Dr. Joseph Wade Thompson, Independence, aged 61, died December 25 of pulmonary tuberculosis.

Dr. Sidney A. Majure, Hickory, aged 75, died December 8 of cardiovascular renal disease.

MISSOURI

The Boone County Medical Society has elected the following officers for the coming year: Dr. R. S. Battersby, Columbia, President; Dr. W. O. Fischer, Columbia, Vice-President; Dr. Maurice E. Cooper, Columbia, Secretary-Treasurer.

The Buchanan County Medical Society has elected the following officers for the coming year: Dr. Charles Greenberg, St. Joseph, President; Dr. C. S. Branson, St. Joseph, Vice-President; Dr. C. Earl Whitsell, St. Joseph, Secretary; Dr. J. M. Bell, St. Joseph, Treasurer.

The Nodaway County Medical Society has elected the following officers or the coming year: Dr. L. E. Egley, Maryville, President; Dr. Hiram Day, Maryville, Vice-President; Dr. W. R. Jackson, Maryville, Secretary-Treasurer.

The Perry County Medical Society has elected the following officers for the coming year: Dr. B. T. Koon, Perryville, President; Dr. O. A. Carron, Perryville, Secretary-Treasurer.

Dr. Harry F. Parker, Warrensburg, has been made State Health Commissioner.

The St. Louis Medical Society will have the commemoratory observance of its one hundredth anniversary April 5-7, inclusive.

DEATHS

Dr. James T. Simpson, Holden, aged 84, died December 20 of pneumonia.

Dr. James O'Gallagher, St. Louis, aged 80, died December 10 of myocarditis and hypertension.

Continued on page 36

WHAT NAME

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Doctors in ever-increasing numbers are coming to rely exclusively upon Heinz Strained Foods for babies and other soft-diet cases.

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Allergy
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Diseases of the Blood
Gynecology
Metabolic and Endocrine Diseases
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Further details and dates will be announced later.

For additional information, address the Registrar

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Nashville, Tennessee

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POSTGRADUATE instruction offered in all branches of medicine.

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SPECIAL COURSES:
Surgery, Gynecology and Obstetrics, beginning May 10, ending June 5, 1937.
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COURSES leading to a higher degree are also offered.

For bulletin furnishing detailed information address the

DEAN GRADUATE SCHOOL OF MEDICINE
1430 Tulane Avenue
New Orleans, La.

Continued from page 34

Dr. Joseph Reagan Hamlin, St. Louis, aged 51, died December 27 of coronary occlusion.

Dr. Wilhelm Nobbe, St. Louis, aged 67, died December 11 of intestinal obstruction.

Dr. Henry Robertson Conway, Marshall, aged 51, died recently of heart disease.

Dr. Frank Lincoln Sanders, Kansas City, aged 70, died December 17 of coronary thrombosis.

Dr. Nein M. Wetzel, Kansas City, aged 67, died recently.

Dr. William C. Webb, Higginsville, aged 74, died February 1.

Dr. George Kirby Sims, Bolivar, aged 57, died January 25.

NORTH CAROLINA

Dr. H. M. Vann, Wake Forest, has been made President of the Wake County Medical Society.

The Green County Medical Society has elected the following officers for the coming year: Dr. W. E. Dawson, Hookerton, President; Dr. E. H. Ellinwood, Secretary-Treasurer.

Dr. John W. Ervin, Morganton, has been made County Physician of Burke County.

Dr. Hillis L. Seay, Sanatorium, has been made Superintendent of the Mecklenburg Sanatorium, Huntersville, succeeding Dr. John Donnelly.

Dr. R. A. Herring, formerly of Greensboro, has been made full time Health Officer of High Point.

Dr. M. P. Whichard, Edenton, has been made Health Officer of Chowan County.

Dr. George Sumner, Ashboro, has been made Health Officer of Randolph County.

Dr. William Z. Bradford and Dr. Wallace B. Bradford, Charlotte, are associated for the practice of obstetrics and gynecology.

Dr. Paul Weldon Sanger, Durham, and Miss Mary Ann Carr were married December 30.

Dr. Newson Battle, Rocky Mount, and Dr. Margaret Elizabeth White were married January 2.

Dr. Victor E. Brown, Washington, and Miss Frankie Lucille Ramseur were married recently.

Dr. Willard Cardwell, Greensboro, and Miss Amelia Martha Hall were married recently.

Dr. Bennette Edward Stephenson, Jr., Weldon, and Miss Alma Hazel McGee were married December 26.

Dr. Wallace Brown Bradford, Charlotte, and Miss Margaret Godfrey were married January 8.

Dr. John McKamie Harry, Fayetteville, and Miss Sarah Katherine Currie were married recently.

DEATHS

Dr. David Allen Garrison, Gastonia, aged 71, died January 15 of coronary occlusion.

Dr. Thomas F. Costner, Lumberton, aged 78, died recently of cerebral hemorrhage and hypostatic pneumonia.

Dr. J. Ernest Stokes, Salisbury, aged 69, died February 1 from a heart attack.

Dr. M. S. Bulla, Elizabeth City, aged 54, died January 28.

OKLAHOMA

The Oklahoma County Medical Society has elected the following officers for the coming year: Dr. Philip M. McNeill, Oklahoma City, President; Dr. C. J. Fisherman, Oklahoma City, Vice-President; Dr. Henry H. Turner, Oklahoma City, Secretary-Treasurer.

The Pawnee County Medical Society has elected the following officers for the coming year: Dr. J. L. LeHew, Pawnee, President; Dr. H. B. Spaulding, Ralston, Vice-President; Dr. L. P. Hetherington, Pawnee, Secretary.

Dr. A. L. Davenport, Holdenville, has been made Health Superintendent of Hughes County.

Dr. George Kimball, Oklahoma City, has opened offices in the Medical Arts Building.

Dr. G. S. Barger, formerly of Purcell, has moved to El Paso, Texas.

Dr. S. H. Williamson, formerly of Duncan, has moved to Bethany.

DEATHS

Dr. John C. Robinson, Henryetta, aged 70, died recently of carcinoma of the throat.

Dr. A. J. McCullough, Checotah, aged 67, died December 1 of uremia and prostatic hypertrophy.

Continued on page 38

Ulcer Therapy *Simplified*

STANDARD REGIMEN

In the standard Sippy procedure, milk and cream mixtures are fed on the hour, alkali on the half-hour. The many feedings—usually 29 daily—are a major disadvantage.

SIMPLIFIED PROCEDURE

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*Ann. Int. Med. Vol. 9, No. 8, Feb. 1936.

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The course begins October 11, 1937. Fee for the course is $600.00.

An intensive four weeks' course in Otolaryngology. This course is for otolaryngologists. The course begins April 12, 1937. Fee for the course is $150.00.

For further information apply to

THE REGISTRAR
WASHINGTON UNIVERSITY
SCHOOL OF MEDICINE
St. Louis, Missouri

Continued from page 36

Dr. D. Armstrong, Durant, aged 60, died January 28.
Dr. DeWitt Stone, Sayre, aged 63, died January 16.
Dr. H. C. Johnson, Antlers, aged 68, died recently.
Dr. Charles S. Neer, Vinita, aged 58, died January 22.
Dr. A. W. Nunnery, Chickasha, aged 48, died January 10.
Dr. William Kenneth Hudson, Hartshorne, aged 76, died recently.

SOUTH CAROLINA

The Florence County Medical Society has elected the following officers for the coming year: Dr. Lamar Lee, Florence, President; Dr. W. S. Lynch, Lake City, Vice-President; Dr. James A. Bradley, Florence, Secretary-Treasurer.

The Lexington County Medical Society has elected the following officers for the coming year: Dr. Karl Able, Leesville, President; Dr. James Crosson, Leesville, Vice-President; Dr. J. H. Mathias, Lexington, Secretary-Treasurer.

The York County Medical Society has elected the following officers for the coming year: Dr. J. R. DesPortes, Fort Mill, President; Dr. J. E. Massey, Rock Hill, Vice-President; Dr. J. I. Barron, York, Secretary-Treasurer.

Dr. William B. Lyles, Spartanburg, has been made President of the South Carolina Urological Association.

Dr. Aquilla Richard Johnston, St. George, and Miss Catherine Deitrick were married recently.

Dr. Henry Clay Robertson, Jr., Charleston, and Miss Caroline Elizabeth Lebby were married January 2.

Dr. John Thomas Assey, Jr., Georgetown, and Miss Helen Louise Maguire were married January 5.

Dr. Claude S. Finney and Miss Elizabeth Nolan, both of Spartanburg, were married January 9.

TENNESSEE

The Lincoln County Medical Society has elected the following officers for the coming year: Dr. R. E. McCown, Fayetteville,

Continued on page 40

THE NEW YORK POLYCLINIC
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Continued from page 38

President; Dr. T. R. Odom, Mulberry, Vice-President; Dr. M. F. Brown, Fayetteville, Secretary-Treasurer.

Dr. Tate Carl, Memphis, and Miss Dora Bishop were married recently.

Deaths

Dr. Millard Dudley Jeffries, Memphis, aged 31, died December 24 of hypostatic pneumonia and arteriosclerosis.

Dr. Robert Lee Hyder, Maryville, aged 58, died January 3 of injuries received in an automobile accident.

TEXAS

The Dallas Southern Clinical Society held its Ninth Annual Spring Clinical Conference March 15-18.

The Texas Eye, Ear, Nose and Throat Society has elected the following officers for the coming year: Dr. W. E. Howard, Dallas, President; Dr. H. T. Aynesworth, Waco, and Dr. J. B. Nail, Wichita Falls, Vice-Presidents; Dr. Kelly Cox, Dallas, Secretary.

The Anderson-Houston Counties Medical Society has elected the following officers for the coming year: Dr. Fred E. Felder, Palestine, President; Dr. Sam D. Barclay, Crockett, Vice-President; Dr. W. O. Funderburk, Palestine, Secretary.

The Bexar County Medical Society has elected the following officers for the coming year: Dr. William H. Cade, San Antonio, President; Dr. J. Manning Venable, San Antonio, Vice-President; Dr. Edward W. Coyle, San Antonio, Secretary; Dr. H. McC. Johnson, San Antonio, Treasurer.

The Brazos-Robertson Counties Medical Society has elected the following officers for the coming year: Dr. W. B. Cline, Bryan, President; Dr. W. S. Parker, Calvert, Vice-President; Dr. S. B. Slaughter, Bryan, Secretary.

The Cass-Marion Counties Medical Society has elected the following officers for the coming year: Dr. E. W. Grumbles, Atlanta, President; Dr. J. I. Allen, Bloomburg, Vice-President; Dr. J. D. Nichols, Atlanta, Secretary.

The Childress-Collingsworth Counties Medical Society has elected the following officers for the coming year: Dr. F. A. White, Childress, President; Dr. P. R. Jeter, Childress, Dr. E. W. Moss, Wellington, Dr. O. R. Goodall, Memphis, Vice-Presidents; Dr. D. C. Hyder, Memphis, Secretary-Treasurer.

The Collin County Medical Society has elected the following officers for the coming year: Dr. A. C. Corry, Farmersville, President; Dr. P. D. Robason, McKinney, Vice-President; Dr. Charles M. Shumway, McKinney, Secretary-Treasurer.

The Denton County Medical Society has elected the following officers for the coming year: Dr. William H. Magness, Denton, President; Dr. J. H. Allen, Justin, Vice-President; Dr. Bert E. Davis, Denton, Secretary-Treasurer.

The Grayson County Medical Society has elected the following officers for the coming year: Dr. C. D. Strother, Sherman, President; Dr. Max R. Woodward, Sherman, Vice-President; Dr. E. F. Etter, Sherman, Secretary-Treasurer.

The Gregg County Medical Society has elected the following officers for the coming year: Dr. William M. Routon, Kilgore, President; Dr. Leila Rose Robertson, Gladewater, Vice-President; Dr. Ben Andres, Longview, Secretary-Treasurer.

The Guadalupe County Medical Society has elected the following officers for the coming year: Dr. R. L. Knolle, Seguin, President; Dr. Quinn Gard, Seguin, Vice-President; Dr. M. B. Bradenberger, Seguin, Secretary-Treasurer.

The Hardeman-Cottle-Foard-Motley Counties Medical Society has elected the following officers for the coming year: Dr. J. W. Conley, Quanah, President; Dr. A. C. Traweek, Matador, Vice-President; Dr. Mildred V. Hanna, Quanah, Secretary-Treasurer.

The Gonzales County Medical Society has elected the following officers for the coming year: Dr. George Holmes, Gonzales, President; Dr. A. B. Parr, Gonzales, Vice-President; Dr. L. J. Stahl, Gonzales, Secretary-Treasurer.

The Harris County Medical Society has elected the following officers for the coming year: Dr. William E. Ramsey, Houston, President; Dr. J. C. Alexander, Dallas, Vice-President; Dr. Frances R. Vanzant, Houston, Secretary; Dr. William A. Toland, Houston, Treasurer.

The Henderson County Medical Society has elected the following officers for the coming year: Dr. A. H. Easterling, Athens, President; Dr. J. K. Webster, Athens, Vice-President; Dr. D. Price, Athens, Secretary-Treasurer.

The Hill County Medical Society has elected the following officers for the coming year: Dr. J. F. McDonald, Hillsboro, President; Dr. R. A. Olive, Hillsboro, Vice-President; Dr. J. E. Boyd, Hillsboro, Secretary-Treasurer.

The Lampasas County Medical Society has elected the following officers for the coming year: Dr. John W. Ellis, Lampasas, President; Dr. W. M. Brook, Lampasas, Vice-President; Dr. W. V. Bessonette, Sanatorium, Secretary-Treasurer.

The Lubbock-Crosby Counties Medical Society has elected the following officers for the coming year: Dr. M. H. Benson, Lubbock, President; Dr. M. M. Ewing, Lubbock, Vice-President; Dr. H. E. Mast, Secretary-Treasurer.

The Medina - Uvalde - Maverick - Val Verde - Terrell - Edwards - Real - Kinney - Zavalla Counties Medical Society has elected the following officers for the coming year: Dr. Elizabeth Donaldson, Del Rio, President; Dr. George H. Merritt, Uvalde, Vice-President; Dr. Joe I. Sanders, Del Rio, Secretary-Treasurer.

Dr. M. C. Williams, San Marcos, has been made Health Officer of Hays County.

Dr. B. W. Dorbandt, Wichita Falls, has been appointed Superintendent of the State Hospital of that city.

Dr. J. E. Ross, Henderson, has been made Health Officer of Rusk County.

Continued on page 42

Classified Advertisements

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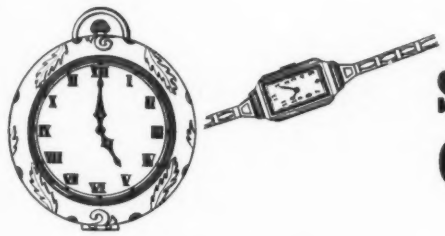

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R. B. H. GRADWOHL, M.D., Director

Continued from page 40

Dr. W. A. Smith, San Antonio, has been made Director of Mental Hygiene of the State Health Department.

Dr. J. E. Frost, DeKalb, has been made Health Officer of Bowie County.

Dr. George W. Cox, Del Rio, has been made State Health Officer, succeeding Dr. John W. Brown.

Dr. Joe R. Gandy, Lipan, has been made Chief Surgeon of the Southern Pacific Lines in Texas and Louisiana.

Dr. A. C. Scott, Sr., Temple, has been made Senior Regent of Texas for the International College of Surgeons.

Dr. R. B. Wolford, Wichita Falls, has been made Director of the Bureau of Communicable Disease of the State Health Department.

Dr. Curtice Rosser, Dallas, has been made a Fellow in the Southern Surgical Association.

Dr. Charles W. Flynn, Dallas, has been made First Vice-President of the Southern Surgical Association.

Dr. H. O. Wyneken, Dr. W. Talbot Foster and Dr. E. B. Lochte, San Antonio, have been made members of the Board of Directors of the Robert B. Green Memorial Hospital.

Dr. T. D. Young, Roscoe, has been taking postgraduate work in St. Louis.

Dr. T. L. Hyde, Wichita Falls, has returned after taking postgraduate work in Rochester, Minnesota.

Dr. M. F. Buel has moved from Henderson to Pima, Arizona.

Dr. Charles W. Castner has moved from Wichita Falls to Austin.

Dr. J. L. DeWitt has moved from LaFeria to Mercedes.

Dr. Lee E. Edens has moved from Austin to New York, New York.

Dr. George S. Littell has moved from Santa Fe, New Mexico, to Dallas.

Dr Charles O. Moody has moved from Santa Anna to Coleman.

Dr. Willa Louise Pierce has moved from Aubrey to Chicago, Illinois.

Dr. P. C. Shands has moved from Forney to Mesquite.

Dr. W. I. Southerland has moved from Leonard to Sherman.

Dr. Elbert Thornton has moved from Rochester to Odessa.

Dr. B. A. Wright has moved from Kilgore to Kermit.

Dr. R. B. Wolford has moved from Wichita Falls to Austin.

Dr. V. J. Donnelly, Temple, and Miss Amelia Boriskie were married December 23.

Dr. W. M. Crawford, Fort Worth, and Mrs. Ivy Atkins were married December 31.

Dr. W. R. Kelly, Jasper, and Mrs. Jessie Cannon were married recently.

Dr. I. Sellers Moore, Runge, and Miss Dorothy Cronin were married December 31.

Deaths

Dr. George Stephens, Mesquite, aged 62, died December 19 of pneumonia.

Dr. Augustus Thompson, Mineral Wells, aged 82, died December 27 of carcinoma.

Dr. William M. Lively, Dallas, aged 72, died December 27 of coronary occlusion.

Dr. Alfred H. Easterling, Athens, aged 71, died December 29 of pneumonia.

Dr. Robert Taylor Canon, Lufkin, aged 70, died January 2 of heart disease.

Dr. Jamie Knox Smith, Texarkana, aged 58, died December 28 from injuries received in an automobile accident.

Dr. Robert Wilson Barton, Temple, aged 80, died December 27.

Dr. James Bennett Crane, Kilgore, aged 54, died recently of heart disease.

Dr. Samuel Bowen Hudson, Sabinal, aged 60, died recently.

Dr. Nathaniel Norris Allen, Houston, aged 62, died recently of angina pectoris.

Dr. James C. Herring, Burlington, aged 74, died recently of heart disease.

Dr. J. Fred Steel, Victoria, aged 65, died recently.

VIRGINIA

The Southside Virginia Medical Association met in Franklin, March 9.

The Alexandria Medical Society has elected the following officers for the coming year: Dr. William B. Wilkins, Alexandria,

Continued on page 44

Mitigation OF THE ARTERIOSCLEROTIC SYNDROME

Two important objectives in the medicinal therapy of arteriosclerosis are the reduction of tension in the larger arteries by opening up the smaller vessels and the exertion of a calmative influence upon the nervous system.

Iocapral was designed to conform to these therapeutic aims. The drugs entering into its composition are theobromine (an efficient peripheral vasodilator); Mebaral* (a sedative suitable for daily use because of the absence of cumulative hypnotic effect), and calcium iodide di-triethanolamine (a new well tolerated iodine compound).

Under the use of Iocapral there is a progressive lowering of high blood pressure and reduction of the frequency and intensity of arterial spasms. Furthermore, according to abundant clinical evidence, the iodine component exerts a beneficial influence in many cases of arteriosclerosis. As Iocapral is usually well tolerated it can be administered over long periods.

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Cyclopropane - Nitrous Oxid - Oxygen
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Plan to visit with us at the Texas State Hospital Association meeting, Lubbock, Tex., April 23-24.

Continued from page 42

President; Dr. James W. Love, Alexandria, Vice-President; Dr. James A. Gooch, Alexandria, Secretary-Treasurer.

The Arlington County Medical Society has elected the following officers for the coming year: Dr. Ralph A. Quick, Arlington, President; Dr. Alfred M. Palmer, Arlington, Vice-President; Dr. Robert H. Detwiler, Arlington, Secretary-Treasurer.

The Richmond Academy of Medicine has elected the following officers for the coming year: Dr. M. Pierce Rucker, President; Dr. Karl S. Blackwood and Dr. M. Morris Pinckney, Vice-Presidents.

The Richmond Ophthalmological and Otolaryngological Society has elected the following officers for the coming year: Dr. A. F. Bagby, President; Dr. Neilson H. Turner, Vice-President; Dr. R. W. Vaughan, Secretary-Treasurer.

The Virginia Neuropsychiatric Society has elected the following officers for the coming year: Dr. Finley Gayle, Richmond, President; Dr. F. H. Redwood, Norfolk, Vice-President; Dr. T. N. Spessard, Roanoke, Secretary-Treasurer.

Dr. Charles Howe Eller, Charlottesville, has been made Director of the Bureau of Rural Health in the State Department of Health.

Dr. R. L. Mason, Roanoke, has been made Surgeon-in-Chief of the Sons of Confederate Veterans.

Dr. E. Thomas Upson announces his association with Dr. L. D. Keyser, Roanoke.

Dr. William McCleery Junkin, formerly of Elkins, West Virginia, has moved to Fredericksburg.

Dr. Charles Denbeigh Marchant, Harmony Village, and Miss Marian Steptoe Fitzhugh were married January 28.

Dr. Clifford Beach, Richmond, and Miss Jebbe Whitehead were married January 30.

Dr. Merle Durmont Bonner, Jamestown, and Miss Blanche Baker Hanff were married January 30.

Dr. Claiborne Barksdale White, Halifax, and Miss Jean Prindle Hardy were married recently.

Dr. William Perry Moore, Jr., and Miss Mary Elfreth Eggleston, both of Norfolk, were married recently.

Dr. Joseph M. Hitch, Charlottesville, and Miss Helen F. Goss were married recently.

Continued on page 46

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ALKALINIZATION
An Effective and Safe Method of Breaking Down "Acid Resistance"
By quickly restoring and maintaining the alkali balance, you can help to break down the "acid resistance" of the patient to more specific medication and so materially mollify symptoms and hasten recovery.
Kalak helps you to do this effectively and safely—because its high buffering power allows it to neutralize much acid without materially changing the pH.
Kalak is synthetically prepared. It is hypertonic, physiologically balanced, uniform in composition and definite in alkali potency.
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FOR RATIONAL NON-SURGICAL TREATMENT OF HEMORRHOIDS

Never Before Such a Combination of Remedies Available for Rectal Medication

Every indication is effectively met. There is Syntropan Roche, the new synthetic antispasmodic that overcomes spasticity, diminishes congestion, and thereby relieves tenesmus. Syntropan, unlike atropine or belladonna, does not cause mydriasis, dryness, or tachycardia. There is also Larocaine Roche, the new synthetic local anesthetic that is twice as effective as cocaine on mucous surfaces. Thus we have immediate blocking of painful impulses, immediate relaxation, and perfect synergism with the antispasmodic influence of Syntropan, so that engorgement of the veins is markedly diminished. A third ingredient is Thigenol Roche, the sulphoöleate preparation that contributes emollient, antipruritic, and antiseptic qualities to Airol Suppositories. And finally there is Airol Roche itself. Airol is bismuth oxyiodogallate, imparting antiseptic and healing influences. Airol liberates nascent iodine in the presence of moisture.

In boxes of twelve

HOFFMANN · LA ROCHE · INC · NUTLEY · N · J ·

WHEN CHILDREN WILL NOT DRINK MILK

A happy solution to the problem is often offered by Horlick's Tablets—a delicious MALTED MILK confection—which delight children.

Or as a nourishing food-drink, Horlick's the Original, on account of its pleasing flavor, is as appealing to children, as it is good for them.

Listen to our Radio Program
LUM AND ABNER
Every night except Sat. and Sun.
NBC Blue Network

HORLICK'S MALTED MILK CORP.
Racine, Wis.

Continued from page 44

Dr. George Audney Reynolds, Bowling Green, and Miss Pearle Maupin Young were married December 31.

Dr. Paul K. Candler, Emory, and Miss Leah Estelle Haynie were married December 22.

DEATHS

Dr. William M. Phillips, Wallace, aged 87, died December 1 of pneumonia.

Dr. Henry C. Fisher, Arlington, aged 69, died December 18.

Dr. William Aloysius McGowan, Richmond, aged 61, died December 7.

Dr. James Bernard Hackley, Purcellville, aged 60, died February 4.

Dr. Robert Edward Fortune, Damascus, aged 66, died December 26 of pneumonia.

Dr. W. A. Newman, Manassas, aged 84, died January 27.

Dr. Samuel Wellington Maphis, Warrenton, aged 69, died January 26.

Dr. G. M. Wallace, Falmouth, aged 88, died January 28.

WEST VIRGINIA

The Wetzel County Medical Society has elected the following officers for the coming year: Dr. T. B. Gordon, New Martinsville, President; Dr. L. P. Stanley, Pine Grove, Vice-President; Dr. K. M. Hornbrook, New Martinsville, Secretary-Treasurer.

Dr. William McCleery Judkin, formerly of Elkins, has moved to Fredericksburg, Virginia.

DEATHS

Dr. Marcus L. Dillon, Lewisburg, aged 58, died January 31.

Dr. Francis Murray Phillips, Charles Town, aged 65, died December 9 of lobar pneumonia.

Dr. Charles L. Hopkins, Huntington, aged 73, died recently.

Dr. Charles Wesley Riggs, Cameron, aged 70, died December 25 of arteriosclerosis and coronary thrombosis.

Dr. D. Edward Morgan, Ansted, aged 51, died December 31 of an injury received in a fall.

Dr. S. S. Wade, Morgantown, aged 79, died January 22.

Amenorrhea

Scanty Menstruation

HORMOTONE

When menstruation fails to appear or is scanty and irregular and associated with low metabolism and obesity or hypothyroidism,

prescribe

HORMOTONE

Bottles of 100 tablets

G. W. Carnrick Co.
20 Mt. Pleasant Avenue
Newark, N. J.

BECAUSE THE CALF HAS "FOUR STOMACHS"

Nature provided a milk, for the calf, that forms large tough curds when acted upon by the gastric enzymes. This characteristic should be considered along with the other physico-chemical differences between cow's milk and human milk when cow's milk is modified for infant feeding. By the laboratory method used in the preparation of Similac, the salts of cow's milk are altered in character and in their relation to each other so that the formation of large calcium caseinate curds is prevented. Thus, Similac is similar to breast milk physically as well as metabolically. . . . It forms a similar fine, flocculent, easily digestible curd.

SIMILAC

ACCEPTED AMERICAN MEDICAL ASSN.

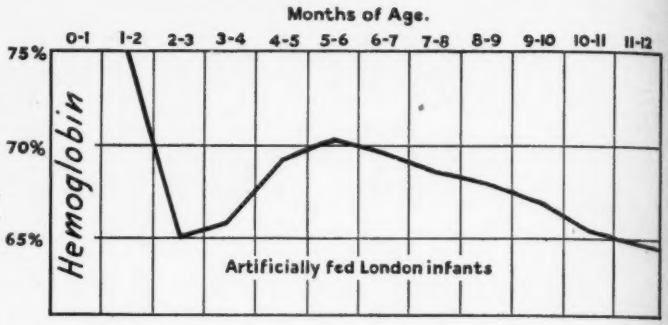
M & R DIETETIC LABORATORIES, INC., COLUMBUS, OHIO

Similac is not advertised to the laity and no directions appear on or in the trade package.

Similac is made from fresh skim milk (casein modified) with added lactose, salts, milk fat, and vegetable and cod-liver oils.

Nutritional Anemia in Infants

The accompanying chart of the hemoglobin level in the blood of infants is based on more than 1,000 clinical cases studied by Mackay. The sharp drop in hemoglobin during the early months of life has also been reported by a number of other authorities. It is noteworthy that this fall in hemoglobin has been found to parallel closely that of diminishing iron reserve in the infant's liver. The usual milk formula of infants in early life further contributes to this anemia because milk is notably low in iron. It is now possible, however, to increase significantly the iron intake of bottle-fed infants from birth by feeding Dextri-Maltose With Vitamin B in the milk formula. After the third month Pablum as the first solid food offers substantial amounts of iron for both breast- and bottle-fed babies.



Reasons for Early Pablum Feedings

1. The iron stored in the infant's liver at birth is rapidly depleted during the first months of life. (Mackay,[1] Elvehjem.[2])

2. During this period the infant's diet contains very little iron—1.44 mg. per day from the average bottle formulae of 20 ounces, or possibly 1.7 mg. per day from 28 ounces of breast milk. (Holt.[3])

For these reasons, and also because of the low hemoglobin values so frequent among pregnant and nursing mothers (Coons,[4] Galloway[5]), the pediatric trend is constantly toward the addition of iron-containing foods at an earlier age, as early as the third or fourth month. (Blatt,[6] Glazier,[7] Lynch[8].)

The Choice of the Iron-Containing Food

1. Many foods reputed to be high in iron actually add very few milligrams to the diet because much of the iron is lost in cooking or because the amount fed is necessarily small or because the food has a high percentage of water. Strained spinach, for instance, contains only 1 to 1.4 mg. of iron per 100 gm. (Bridges.[9])

2. To be effective, food iron should be in soluble form. Some foods fairly high in total iron are low in soluble iron. (Summerfeldt.[10])

3. **Pablum is high both in total iron (30 mg. per 100 gm.) and soluble iron (7.8 mg. per 100 gm.) and can be fed in significant amounts without digestive upsets as early as the third month, before the initial store of iron in the liver is depleted. Pablum also forms an iron-valuable addition to the diet of pregnant and nursing mothers.**

Pablum (Mead's Cereal thoroughly cooked and dried) consists of wheatmeal, oatmeal, cornmeal, wheat embryo, brewers' yeast, alfalfa leaf, beef bone, iron salt and sodium chloride.

[1-10] Bibliography on request.

MEAD JOHNSON & COMPANY, Evansville, Indiana, U. S. A.

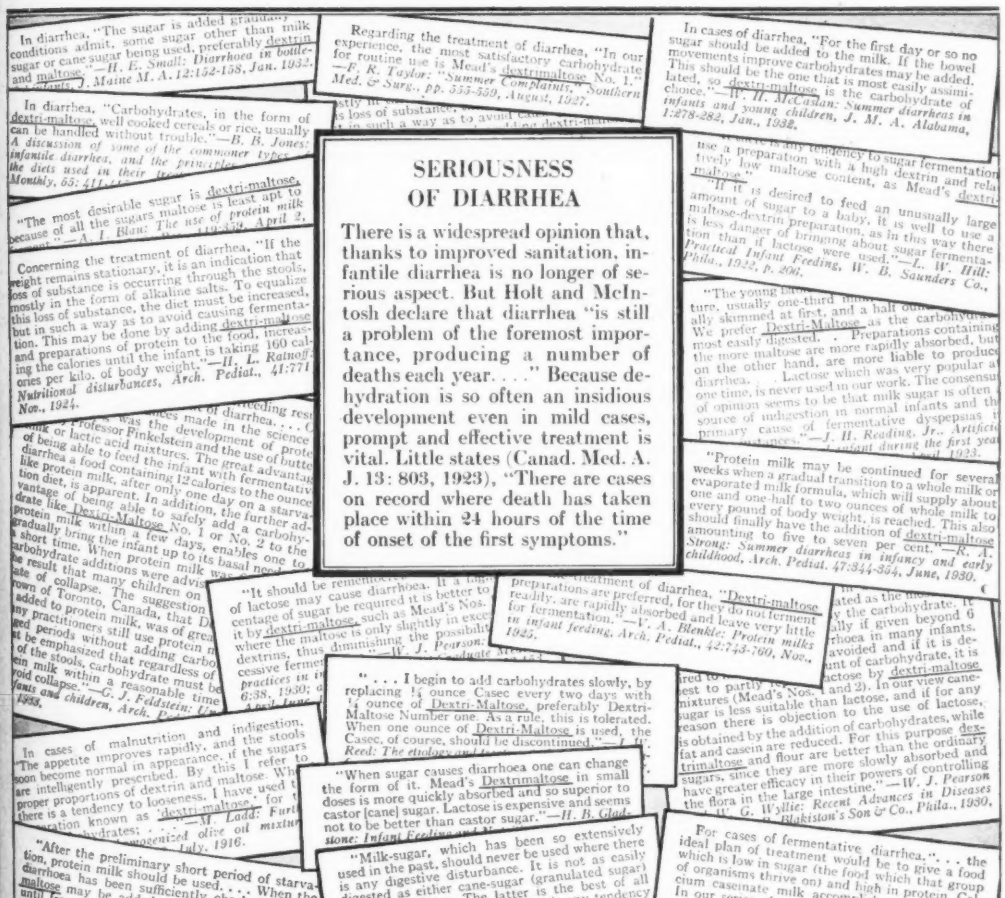
Please enclose professional card when requesting samples of Mead Johnson products to cooperate in preventing their reaching unauthorized persons

DIARRHEA

"the commonest ailment of infants in the summer months"

(HOLT AND McINTOSH: HOLT'S DISEASES OF INFANCY AND CHILDHOOD, 1933)

One of the outstanding features of DEXTRI-MALTOSE is that it is almost unanimously preferred as the carbohydrate in the management of infantile diarrhea.



SERIOUSNESS OF DIARRHEA

There is a widespread opinion that, thanks to improved sanitation, infantile diarrhea is no longer of serious aspect. But Holt and McIntosh declare that diarrhea "is still a problem of the foremost importance, producing a number of deaths each year. . . ." Because dehydration is so often an insidious development even in mild cases, prompt and effective treatment is vital. Little states (Canad. Med. A. J. 13: 803, 1923), "There are cases on record where death has taken place within 24 hours of the time of onset of the first symptoms."

Just as DEXTRI-MALTOSE is a carbohydrate modifier of choice, so is CASEC (calcium caseinate) an accepted protein modifier. Casec is of special value for (1) colic and loose green stools in breast-fed infants, (2) fermentative diarrhea in bottle-fed infants, (3) prematures, (4) marasmus, (5) celiac disease.

MEAD JOHNSON & CO., EVANSVILLE, IND., U. S. A.

When requesting samples of Dextri-Maltose, please enclose professional card to cooperate in preventing their reaching unauthorized persons.

One of a series of advertisements prepared and published by PARKE, DAVIS & CO. in behalf of the medical profession.
This "See Your Doctor" campaign is running in the *Saturday Evening Post* and other leading magazines.

"I never want to go to another party!"

"BUT, dear, tell Mother—what *is* the matter?"

"They wouldn't let me play with them. They let me be by myself all the time. They—they *laughed* at me."

What should Mother do? Denounce the other children as ill-raised little barbarians? Prevent further contact with the youngsters who should be the child's playmates, and the neighborhood that should be her happy little world?

Those would be natural and understandable reactions for any mother. But unfortunately, they would tend only to make matters worse.

When a child is "different" or "difficult," the most sensible thing to do is to get the help of your doctor. And the reason is that the underlying cause, while occasionally psychological, is usually *physical*.

For instance, a child can be slow and awkward at childhood games, because anemia is robbing her of energy. A child can appear backward because a glandular disorder is causing sluggishness, because faulty hearing prevents her from catching questions, or because faulty eyesight prevents her from reading correctly. A child can be sulky or ill-tempered, not because it is her nature to be so, but because some physical derangement is *making* her act that way.

The tragedies these disorders heap upon little heads are very real tragedies. But even more serious is their possible influence on the child's future. The "laughed-at" child so often becomes the crushed and morose adolescent. And the morose adolescent frequently becomes an embittered man or woman in an unfriendly world.

If your child's present and future happiness is being threatened, see your doctor. You will find him a helpful and understanding friend.

PARKE, DAVIS & COMPANY
DETROIT, MICHIGAN

The World's Largest Makers of Pharmaceutical and Biological Products